PROCEEDINGS OF THE THIRD INTERNATIONAL FISHERIES OBSERVER CONFERENCE

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International Fisheries Observer Conference

NEW ORLEANS ★ LOUISIANA ★ USA ★ NOVEMBER 18-21 2002

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

NOAA Technical Memorandum NMFS-SPO-64
September 2004

Proceedings of the Third International Fisheries Observer Conference

Edited by Victoria Cornish, Aloysius Didier, Jr., James Nance, Michael Tork, John Lafargue, Margaret Toner, Teresa Turk, Brian Donahue, Ben Rogers, and David Kulka, in collaboration with the conference participants

NOAA Technical Memorandum NMFS-SPO-64
September 2004

U.S. Department of Commerce
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National Oceanic and Atmospheric Administration
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Under Secretary for Oceans and Atmosphere

National Marine Fisheries Service
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Suggested citation:

NMFS. 2004. Proceedings of the Third International Fisheries Observer Conference. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-64, 192 p.

A copy of this report may be obtained from:

NMFS Office of Science and Technology
National Observer Program, F/ST4
1315 East-West Highway
Silver Spring, MD 20910

Or online at:

http://www.st.nmfs.noaa.gov (National Observer Program)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, MD 20910

THE DIRECTOR

November 18, 2002

Welcome Observer Conference Participants!

On behalf of the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries), I am very pleased to welcome you to the Third International Fisheries Observer Conference. NOAA Fisheries is proud to be able to sponsor this year's conference, in cooperation with the Canada Department of Fisheries and Oceans (DFO).

The Conference Steering Committee and I welcome this opportunity to provide a forum for bringing together the international observer community to share ideas, technology, and information to strengthen our collective programs. The conference is intended to stimulate discussion on many of the challenges that fisheries observer programs face worldwide. During the days ahead, it will be *your* contributions, experiences, and insights that will contribute to the success of this conference.

The Steering Committee has structured this event to provide ample opportunities for discussion and exchange of information. We invite you to take an active part in the discussions scheduled during the General Session, the posters, program overviews, and exhibits presented in the Poster Session, and the informal opportunities to network and share experiences at the Evening Social Events. We also hope you will enjoy the sites, sounds, and flavors of New Orleans' world-renowned French Quarter.

We hope you enjoy your time in New Orleans. Please let us know if there is anything we can do to make your stay more enjoyable.

Sincerely,

Bill

William T. Hogarth, Ph.D.

THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

Contents

Acknowledgments

The conference steering committee would like to thank all of the panelists, poster presenters, exhibitors, and other conference participants for their contributions and insights to the design and administration of fisheries observer programs and the use of observer data to enhance stewardship of the world's living marine resources. The conference could not have been the success it was without the contributions of the following:

- Al Didier, for his timely preparation of the conference proceedings, and his patience with the committee before, during, and after the conference;
- Kim Dietrich, for her creative efforts to secure funding and assistance to get observers from the U.S. and Canada to attend the conference;
- Lorraine McDonald, for her tireless efforts during the conference loading presentations and keeping us technically organized;
- Micah Allen, Fiona Lipscomb, Joe Lovett, and the entire staff of the Astor Crowne Plaza Hotel in New Orleans, for their attention to detail, luxury accommodations, technical equipment and support, delicious food, and warm southern hospitality;
- TecuLan, Inc. (Joe Renfro, Rhonda Stone, Earline Briscoe, and Winnie Mutuli) for their assistance with conference logistics and finances;
- Evelyn Van Kirk and Wilma Nance, for their excellent organizational skills and good humor providing assistance with registration and conference logistics;
- The many fisheries observers and other conference participants who graciously volunteered their time and effort during the conference helping with registration, moving boxes, selling t-shirts, monitoring the tape recorder, and other critical tasks; and
- The merchants, musicians, and street performers of the French Quarter of New Orleans, who provided a lively backdrop for after-hours deliberations and entertainment.

The conference was sponsored by the U.S.A. National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries), in cooperation with the Canada Department of Fisheries and Oceans. For more information about these programs, contact the following web sites:

- U.S.A. NOAA Fisheries-http://www.nmfs.noaa.gov/
- U.S.A. NOAA Fisheries, National Observer Program-http://www.st.nmfs.gov/st1/nop/
- Canada Department of Fisheries and Oceans-http://www.seawatch2000.nf.ca/can_programs.htm

The 3rd International Fisheries Observer Conference Steering Committee: (left to right): Mike Tork, Margaret Toner, Brian Donahue, John LaFargue, Victoria Cornish (Chair), Jim Nance, Ben Rogers, and David Kulka.

Executive Summary

This conference was the third in a biennial series designed to bring together individuals active or interested in fisheries observer programs throughout the world to share ideas and discuss key issues of common interest. The audience of over 200 came from 22 nations and included representatives of government agencies, observer service delivery companies, universities, private consulting and research organizations, software developers, labor unions, and observers themselves.

The conference began with overviews of the fisheries observer programs active in the United States in general, the North Pacific, Namibia, and the South Pacific. The story of one observer's recent experiences aboard a longliner in the Bering Sea reminded participants that fishing is a dangerous business, bad things can happen quickly, and help is sometimes far away. The remainder of the conference was devoted to nine panels that each addressed a central question or theme facing observer programs. Panel presentations were followed by questions and audience participation.

Panel Session 1—What Is the Best Mix of Observer Presence and Compatible Technologies?

In some cases, expanding the application of existing technologies can make the job of observers safer and more accurate. These can include dedicated sampling stations, motion-compensated scales, and two-way communications within vessel monitoring systems (VMS). The use of any or all of these may be constrained by cost considerations in some sectors of the fishing fleet. New computer technologies promise to automate and integrate some data collection processes. These tools can make it more likely that some data will be collected, and can improve the quality of those data that are collected. Other key points raised by panelists included:

- Technology can be viewed as a complement to observers, but not as a universal replacement. Some tasks, like catch sampling, still require the human touch.
- Even automated systems require extensive shoreside support to make the data usable in a timely manner. VMS systems must be monitored, and video data must be interpreted. Software to automate the analysis of video data is still in development.

Panel Session 2—How Do Observer Programs Achieve Optimal Coverage?

Optimal coverage is hard to define and harder still to achieve. In the ideal world, policy makers articulate clear goals and science drives coverage rates. In reality, coverage rates are often arbitrary and based on political considerations, the objectives of multiple mission statements may conflict, new objectives may be added with no consideration of their impact on sample design, fishery patterns change and alter coverage needs, and operational problems can prevent the achievement of coverage goals. To counter these influences, panelists suggested the following key point:

- Avoid arbitrary coverage goals whenever possible. Strive to base coverage levels on a targeted Coefficient of Variability for the desired estimate, or on a binomial probability of making the desired observation.

Panel Session 3—What Is the Observer's Role in Violation Situations?

From their vantage points onboard fishing vessels, observers may view regulatory violations from one or more perspectives. They may have information relating to a violation or crime, they may themselves be the victims of a crime, or they may be the developer/collector of the information at issue in a case. Opinions vary on the proper enforcement role for fisheries observers, ranging from that of active participant in investigation and prosecution to that of collector of pure scientific data that may incidentally possess information pertinent to an investigation. Key points raised by panelists included:

- The observer is a witness, not an enforcement agent. In this capacity, it is important for the observer to be a good witness, who entails providing good (clear, complete, precise, detailed) documentation and staying involved for the long term.
- The presence (or sometimes the recent presence) of an observer can itself serve as a deterrent to illegal behavior.
- The principal risk of an active enforcement role for observers is its potential to jeopardize the cooperation of the fishing industry.

Panel Session 4—How Are Observer Data Used to Regulate Fisheries?

Observer data are used extensively throughout the world as an essential component of many fishery management strategies. In some fisheries, their data form the sole basis for in-season management decisions. Their data are used to address research questions, and to evaluate alternative management strategies and proposed regulation changes. Other key points raised by panelists included:

- Observer data can be leveraged through comparisons with other data sources. Differences between these sources can often be more revealing than any source examined individually.
- It is likely that the use of observer data in future fishery management plans will only increase.

Panel Session 5—How Should Contractor Performance Be Measured?

The variety of observer service delivery models has complicated the process of contractor evaluation. In some of these models, government agencies are no longer the clients. The ability of a government agency to evaluate and influence a contractor is limited when there is no contractual relationship between the parties. Within the constraints of their particular service structures, observer programs need to focus on performance measures that enhance their own program objectives. Key points raised by panelists included:

- Make performance standards clear and quantifiable, and make certain that contractors understand the consequences of noncompliance.
- Recognize that some factors may be beyond the control of a contractor.
- Consider input from a variety of sources during evaluation, because contractor performance affects the fishing industry and observers as well as government agencies.

Panel Session 6—How Should Observers Be Selected and Trained?

Many observer programs attribute their successes to the performance of their observers. Proper selection and training can be the cornerstone of that success. Panelists explored those concepts and raised the following key points:

- Use selection techniques that identify the aptitudes, attitudes, and backgrounds of potential observers in addition to educational experiences to identify those most suited to the rigors of life as observers.
- Recognize that observer trainees are often in transitional stages of their lives or careers and that training can be stressful. Be prepared to mitigate those stresses to improve the educational experience.
- Consider training as a multifaceted experience that should be inspirational as well as educational. Recognize that some will need extra help in order to succeed.

Panel Session 7—What Is Meant by Observer Support, and Why Is It Important?

Support for observers can range from compensation and insurance to dealing with conflict and harassment. Although government agencies are less frequently the direct employers of observers, they have a stake in building and maintaining a foundation of support due to the potential impacts on observer retention/experience and data quality. The following key points were raised:

- Interpersonal conflict, sexual harassment, and/or assault can and most likely will occur. Observer programs must be prepared (and must prepare observers) to deal with them.
- Observers who function in a compliance and/or enforcement role are subjected to unique stresses that require an additional measure of government agency involvement and backup.
- National standards for compensation and insurance are one of the tools government agencies are exploring to build a support foundation. Some would like to see this approach expanded.

Panel Session 8—Lessons Learned: What Guidance Can Be Provided to New Observer Programs?

Despite their differences, observer programs worldwide share many common elements. New and existing programs can learn from their common experiences. Panelists explored their successes and frustrations, and some of them included the following:

- Define your goals and objectives, and follow through with an evaluation of successes afterward.
- Communicate with the fishing industry, within and among affected government agencies, and with observers. Effective communication is essential for success and an ongoing responsibility of program staff and observers.
- Get industry onboard. Under the proper circumstances and with prudent controls, consider the use of alternative data collection methods, like fisher self-sampling or cooperative research projects with industry.
- Take care of your observers. They are the key to your success.
- Love your data. The data represent the only real product of observer programs, so go to extraordinary lengths to ensure they are not compromised.

Panel Session 9—Is the Risk of Deploying Observers Worth the Data Collected?

Fishing is one of the most dangerous occupations in the world. Fishing vessels are largely un-inspected, and fishing crews are generally not formally trained in safety, survival, or vessel stability. Yet observing is a growth industry because observers provide information that is essential to the sustainable management of fishery resources. Key points raised by panelists included:

- Managers, the fishing industry, and observers all assume different types and levels of risk through their participation in observer programs. All need to evaluate their own level of risk (and risk tolerance) and take steps to mitigate it.
- Safety training for observers should be made as thorough and realistic as possible. Videos are a start, but hands-on training should be required. Make certain that observers know what to look for, how to recognize dangerous situations, and how to respond if those situations are present.
- Information on the safety status of individual vessels should be more widely available, and potential incentives that encourage improvement should be investigated.

CONFERENCE SESSIONS

Introductory Session

Session moderator Jim Nance welcomed participants to New Orleans and the International Fisheries Observer Conference, and introduced the keynote speakers.

Observer Programs in the United States

William T. Hogarth, NOAA Assistant Administrator for Fisheries

Observer programs represent one of the top fishery management issues for the National Oceanic and Atmospheric Administration (NOAA) and are likely to be one of the most important topics in fisheries worldwide for years to come. Fishery managers use observers to collect fishery, environmental, and socioeconomic data; perform compliance monitoring; and verify other data sources. Some fisheries data help the agency and the industry to document and avoid bycatch. NOAA's objectives for its observer programs are to meet agency data collection needs as required by applicable laws, ensure that the data are of high quality, and ensure that observers are safe, adequately trained, and free from harassment.

The authorities to place observers reside in several pieces of legislation. Under the Magnuson-Stevens Fishery Conservation and Management Act, observers are placed in federal waters' fisheries to monitor total catch and discard. The Marine Mammal Protection Act applies everywhere marine mammals occur in U.S. waters and focuses observer effort on documenting marine mammal interactions with Category I (and some Category II) fisheries. Under the Endangered Species Act federal fishery management actions are subject to consultations that may require observers to document incidental takes.

U.S. observer programs began in the foreign groundfish and Eastern Tropical Pacific tuna fisheries of the 1970s. The program is currently funded through a combination of government and industry sources, fielding over 500 observers in over 20 fisheries. Coverage rates are based on needs and cost, but are generally low, except in the North Pacific. Rates range between 2% and 100% in East Coast fisheries, and between 5% and 10% in the West Coast groundfish fishery. Since 2000, the number of days at sea logged by U.S. observers has increased from approximately 44,000 to 57,000 days per year, and the number of observed fisheries has increased from 18 to 26. A Management Control Review has been completed, and there is increased emphasis on safety. Workshops and draft legislation have made progress on observer insurance and liability issues.

In the future, NOAA hopes its observer programs will create a more open process with stakeholders, increase state-federal partnerships, and make increased use of advanced technologies. Methods of disseminating observer information need to be improved, and there must be additional work on confidentiality issues. To Hogarth, observer programs are "the program of the future."

Members of the audience asked how NOAA justifies the sometimes conflicting roles in management, data collection, and enforcement that observers are required to play. Hogarth acknowledged that observers are often placed for multiple purposes, but noted that regional management councils in the U.S. ultimately determine the role that observers play in a particular fishery.

Another conference participant noted the declining sustainability of the U.S. economy and the influence of moneyed interests, and wondered when progress would be made on sustainability and resource management. Hogarth replied that over-

capacity in fisheries must be controlled to ensure sustainability. Some members of Congress have expressed their willingness to address this issue, and the National Marine Fisheries Service (NMFS) needs to develop a program that will match effort to available harvest over the long term. A buy-out program may be needed. He noted that fishers and the agency are often at odds, and that the agency needs to convince fishers that management works and can benefit the industry. NMFS also needs to develop partnerships with state agencies to work on recreational fisheries issues. U.S. marine recreational fisheries are now measured in the millions of trips per year and can affect the status of some fish stocks.

Observer Programs and Marine Resource Management: Lessons from the North Pacific

Douglas P. DeMaster, NOAA Alaska Fisheries Science Center

Data collected by the Observer Program in Alaska are used for in-season management of North Pacific groundfish fisheries. Current management strategies would be impossible without the data collected by this program. DeMaster referred to the Observer Program as "the heart and soul of groundfish management in Alaska."

The North Pacific Groundfish Fishery encompasses a large suite of distinct fisheries worth approximately $1.4 billion in processed product value. The fisheries are dispersed across a broad physical geography with diverse users, user groups, and interest groups. An Observer Program has been in place in the North Pacific since the late1970s, initially with foreign nations and evolving into a fully domestic fishery and domestic observer program in the early 1990s. The program in the North Pacific is only one of several large observer programs in the U.S. In 2001, this program oversaw the training and debriefing of 789 fisheries observers on 335 vessels and at 23 processing plants, resulting in 36,555 at-sea days. This program provides a range of fishery-dependent data, which along with fishery-independent data are used to meet the needs of various agency staff. The North Pacific observer data are used by fishery stock assessment scientists, marine mammal scientists, managers, enforcement agents, NOAA attorneys, and various NMFS and North Pacific Fishery Management Council analysts. Other agencies, such as the U.S. Fish and Wildlife Service and the U.S. Coast Guard, also rely on some observer data to meet their responsibilities. The information provided by observers serves as part of an essential foundation of knowledge necessary for agency and Council decision-making in managing marine resources (Figure 1).

The current program functions through four partners, each with its own distinct role in the process. NOAA certifies and debriefs observers, and manages the data they collect. Third-party observer providers recruit and hire observers, interface with the fishing industry, and provide logistic support. The fishing industry funds most of the program (approximately $13 million of the program's estimated $16 million total cost) through service contracts with the third-party providers. Observers, the fourth partner, are responsible for collecting the array of catch, effort, and biological sampling data.

The mission of the North Pacific program has not changed appreciably in the past decade: it provides information essential for the management of sustainable fisheries, associated protected species, and marine habitat in the North Pacific. What has changed are (1) the fisheries management systems, (2) agency responsibilities, (3) how we use observer data to meet our responsibilities, and (4) increased

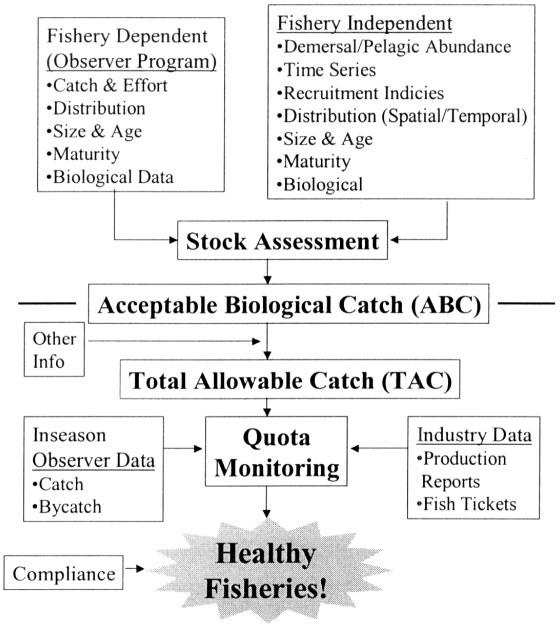


Figure 1. Observer Data Usage in Stock Assessment and Quota Monitoring.

litigation in the management process. Management plans now incorporate in-season quota monitoring and actions triggered by the bycatch and discard of prohibited species. Stock assessment models have become more sophisticated and complex, and ecosystem approaches to management require finer levels of detail. Pressure on observers has increased, since their data can be used for vessel-specific compliance and will often determine whether a vessel may continue to fish. These changes have often challenged the program's ability to meet various agency catch accounting and compliance monitoring needs. Moreover, these changes have increased the demand for rapid acquisition and use of high-quality data at finer levels of detail, resulting in both positive and negative changes in the environment in which observers collect data. The agency and observers have had to adapt to these changes. The agency will be challenged to continue to support these processes of change to keep its programs relevant to future resource management needs. Trends for the future could include changes to the service delivery model, scientifically based coverage levels, advances in technology, increased use of observer data for compliance, and more complicated models as managers move to an ecosystem-based approach.

The audience asked whether NMFS plans to institute a Vessel Monitoring System (VMS) regulatory regime in the North Pacific that would require a complete position track of all fishing vessels. DeMaster replied that vessels wishing to fish in some areas have been required to carry VMS units since the mid-1990s. The units are provided by NMFS, and the regulations require that an operable unit be onboard at all times. Vessel operators are directed to contact enforcement agents immediately if the units become inoperable for some reason.

The Namibian Fisheries Observer Program

Hafeni Mungungu, Fisheries Observer Agency, Namibia, Africa

Namibia is a country in southern Africa with a population of approximately 18 million. Its 1,500-km coastline includes some of the richest fishing grounds in southern Africa. There was heavy fishing interest in the area prior to Namibia's independence in 1990, and a 200-nautical-mile Exclusive Economic Zone was established at that time. Fisheries policy was developed through a White Paper in 1991 and the passage of the Fisheries Resources Marine Act in 1992. Approximately 75% of the country's gross domestic product is associated with the fishing industry.

The observer program began as a monitoring control and surveillance program in 1991, based in the principal harbors of Lüderitz and Walvis Bay. Observers logged approximately 47,000 observer days in 2001. While initial objectives focused on compliance, duties were expanded in the mid-1990s to include collection of other data, such as the independent observation and monitoring of harvest and bycatch, and observations of marine mammals and other protected species. Observer duties are to observe unauthorized discard, unmarked boxes of fish product, use of illegal fishing gear or improper attachments, marine pollution and/or illegal dumping; sample the catch for biological data; and verify logbook completion. The program is managed by five inspectors—three stationed in Lüderitz and two in Walvis Bay—and funded by a mandatory levy on the fishing industry. The 200 observers (35 of whom are female) average 25 to 30 years of age and were employed by the Marine Fisheries and Marine Resources Department as casual workers. They were paid only for days at sea; no other benefits were provided. Approximately 70% have completed high school-level education. Training for data collection tasks was introduced in 1996 with a Fisheries Inspector Observer Course, but more than 50% of current observers still need this training. Vessel safety is regulated by the Ministry of Works, Transportation, and Communication, and vessel owners are responsible for providing safety equipment. Employers are responsible for safety training.

A government policy on restructuring left the observer program largely to its own devices in 1997. Observers were unhappy with their conditions of employment, the fishing industry had concerns regarding observer output, and there was an expansion of observer duties. After a series of consultations with the industry, the Fisheries Observer Agency was created with passage of the Marine Resources Act in 2001 and became operational in May 2002. The Fisheries Observer Agency is charged with administration and management of observer programs, and is directed by a board of six members representing both government and the fishing industry (Figure 2). The line minister is the

Minister of Fisheries and Marine Resources. The Fisheries Observer Agency is not responsible for enforcing fishery regulations; it reports compliance status to two industry/government liaison groups responsible for enforcement. All groups hope to benefit from this new arrangement. Industry hopes to see greater accountability, more information, greater observer professionalism, increased consultation, and more value for its money. Observers benefit from new employment conditions that include a monthly salary with sea allowance and benefits (medical, pension, housing, etc.), increased security and stability, a sense of a future, greater respect, feedback on what happens with the data they collect, and increased ambition. The Marine Fisheries and Marine Resource Department gets improved efficiency and performance, better data for fisheries management, increased data collection capacity, and better value for its money. Approximately 95% of the first three years of funding will be provided by industry through a mandatory levy of $260 (Namibian) per day. The Marine Fisheries and Marine Resource Department will provide the remaining 5% of operating costs, start-up capital, and $3 million (Namibian) for infrastructure.

The Fisheries Observer Agency has now been in operation for six months, and its future has yet to be determined. The Fisheries Observer Agency hopes to continue developing observer biological and scientific skills, and to have all observers complete the Fisheries Inspector Observer Course by May 2003. Other mechanisms for safety training are also under investigation.

Questions from the audience elicited additional perspectives on the magnitude of the program. There are currently seven major fisheries off Namibia using trawl, longline, and trap gear for species such as hake, mackerel, tuna, and crab. Namibianization is a driving force of the new government. All fishing permits were renewed at independence with a requirement of at least 51% Namibian ownership; this requirement was increased to 80% in 2001. Approximately 200 observers cover approximately 350 vessels. Observers are placed on all vessels that can accommodate them; the coverage goal is 20%, but the government would prefer 100%. Observers report compliance at the end of each trip through trip reports or contacts with their port inspector. Since safety is the responsibility of the vessel, observers generally do not perform any safety inspections. The deploying officer checks the vessel for safety gear at the start of the trip, the vessel provides a life jacket, and the agency provides observers with foot gear.

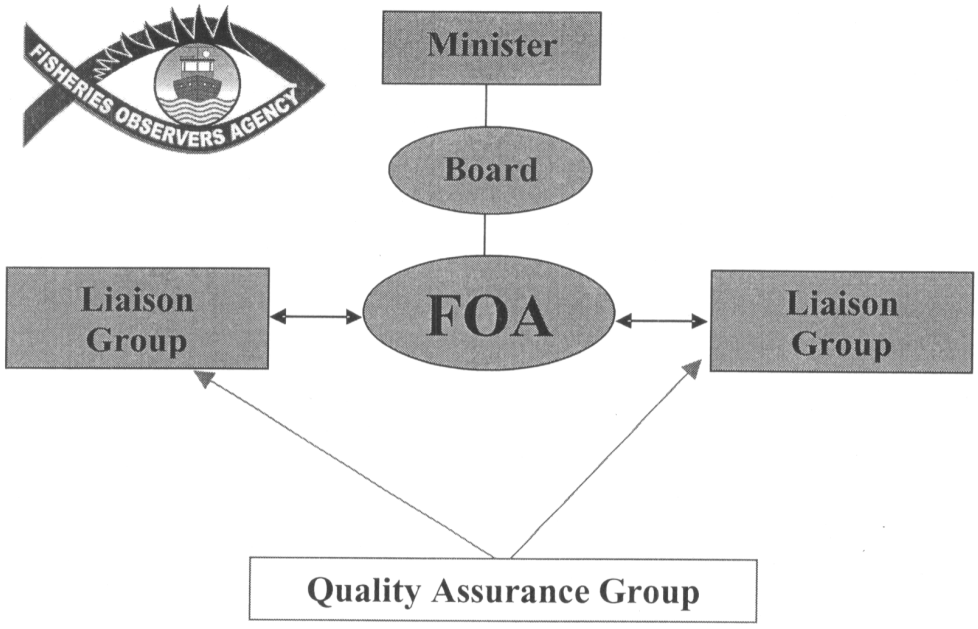


Figure 2. Management Structure of Namibian Observer Program.

The Forum Fisheries Agency Observer Program in the South Pacific

Karl Staisch, Forum Fisheries Agency, Honiara, Solomon Islands

Forum Fisheries Agency, based on Guadalcanal, was formed in 1997 to conserve tropical tunas in surrounding waters. Forum Fisheries Agency is a non-political advisory body consisting of 15 member countries. It administers vessel monitoring systems, regional fishing vessel registration, treaties on surveillance, fisheries treaties, and multi-agency fisheries arrangements. A companion agency, the Secretariat of the Pacific Community, based in New Caledonia, maintains a technical research body that provides training and debriefing input to observer programs.

Observers associated with this program operate in all South Pacific exclusive economic zone waters except those of the French colonies, an area of approximately 30 million square kilometers (11 million square miles), and all seek to collect similar consistent data. Over 1,200 foreign vessels operate in the area with annual licenses, and there are many other smaller traditional fishing vessels. They annually land 1.0 to 1.2 million tons of tuna worth $1.5 to $2.5 million. In many cases, this resource is the only source of income for the islands. Tuna represents one-third of regional exports and 6% to 8% of total regional employment, but only 10% of the catch is ever landed onshore in FFA member countries (Figure 3). Observer programs in the South Pacific operate with some problems unique to the region and others that are common throughout the world. Among the unique are political interference, civil wars and military unrest, volcanic eruptions, and the need to move money to observers throughout the world.

Pacific Island nations operate several independent programs. These include programs in the Cook Islands (1 year of operation), Fiji (begun in 1998 but interrupted by coup; restarted by Secretariat of the Pacific Community), the Federated States of Micronesia (since 1969, the oldest program in the region), Kiribati (restarted in 2001, three separate exclusive economic zones with two programs), the Republic of Marshal Islands (momentum building after a slow start in 1998), Papua New Guinea (started in 1995, 50 observers and hoping to expand, include the only prawn/shrimp trawlers in the region), and the Solomon Islands (started in the early 1980s but intermittent due to funding and interference, trying to reorganize after a recent civil war). Programs in Australia and New Zealand are well established, and the Forum Fisheries Agency usually provides no assistance.

Member states with no national program support the two regional multilateral programs of the Forum Fisheries Agency. Under the U.S. Treaty Program, U.S. flag vessels negotiate with the Forum Fisheries Agency for fishing privileges that require 20% observer coverage. Under the Federal States of Micronesia arrangement, vessels from member countries are required to maintain 20% observer

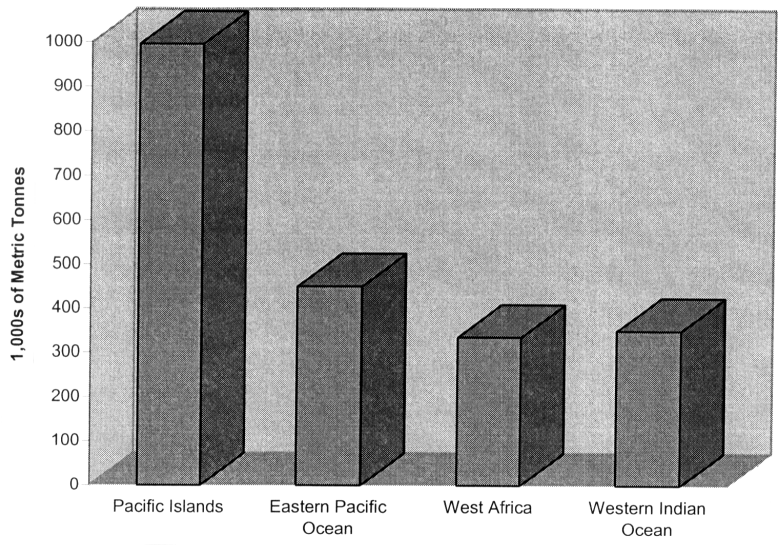


Figure 3. Relative Volumes of Major World Tuna Fisheries.

coverage. While coverage levels are not standardized among all programs, 20% is a rate commonly adopted. Most national programs have difficulty achieving that rate due to lack of funds, but the Federal States of Micronesia and U.S. treaty programs have achieved that rate in recent years.

Observers sanctioned by Forum Fisheries Agency are authorized to operate throughout the region; the fishery takes place throughout the year. They collect as much data as they can based on common United Nations Food and Agriculture Organization standards. All observers in the region are employees of national governments or the Forum Fisheries Agency/Secretariat of the Pacific Community; there are no private providers. They are trained to operate on and board vessels from a variety of countries and domestically licensed vessels ranging in size from small longliners to large superseiners. Vessel condition varies widely, and observers must be willing to accept a wide range of accommodations and food. Once aboard a vessel, an observer must be prepared to disembark anywhere in the world. Observers are debriefed by the Secretariat of the Pacific Community through direct discussions, and retraining may be required if indicated.

Observers come from a variety of backgrounds, but most have completed at least high school-level education. They must speak English, tolerate a variety of customs, and be willing to work for long periods at sea (trips average 7 to 120 days). They are trained by experienced experts in basic skills, sea safety, data collection, radio communications, and first aid. Secretariat of the Pacific Community is also developing standards to enhance data quality. Over 500 observers have been trained, and over 200 of them are still active. The national and regional programs share common data types, formats, and databases.

In early years, observer programs were hindered by low wages; morale was low and coverage targets could not be achieved. Currently there is no shortage of applicants. Observers enjoy a tiered salary schedule, enhanced gear and training, and clothing and equipment allowances. Observers are reasonably well paid, with salaries averaging 1.2 to 10.5 times those they could achieve with employment ashore. Travel throughout the region is a persistent problem, with unreliable and infrequent airline flights, so observers are currently provided per diem at United Nations rates. Forum Fisheries Agency recognizes that reliable observers are a unique resource that should be nurtured.

When asked about the ratio of men to women in the observer corps, Staisch admitted that there are few women observers. Women have low status onboard boats in many Pacific island cultures, and their presence is taboo in some areas. Times are changing slowly, and the FFA tries to involve women at a variety of levels, including data entry. Staisch noted that the U.S. fleet is one of those that refuse to allow women observers aboard. Asked to describe the nature of political interference encountered by the program, Staisch observed that it was more closely associated with corruption or familial ties to influential politicians, rather than to political parties.

Survival at Sea—One Observer's Story

Ann Weckback, Observer, Saltwater, Inc., Anchorage, Alaska

Weckback recounted the events that befell her aboard the F/V Galaxy on October 20, 2002 approximately 30 miles out of St. Paul, Alaska. When the vessel's fire alarm sounded, she made her way to the wheelhouse to find it abandoned. She then returned to her room to collect her survival suit and made her way to the aft deck. Smoke was visible and the vessel was soon rocked with explosions. Weckback and several other crewmen retrieved an injured crewmate from the water, and after initial treatment she placed the man in her own survival suit. Within 15 minutes the vessel was gutted by fire, and the captain ordered the crew to abandon ship. There were too few survival suits, only one life raft remained undamaged, and that raft was cut away before all survivors could board. As the fire approached, Weckback jumped overboard with the injured crewman using a buoy under her arm and later a life ring for flotation. They were unable to reach the life raft and refused to abandon each other. Although the first rescue vessel arrived one hour later, the pair went unnoticed and remained in the water for two hours. By that time Weckback was conscious but not thinking clearly, and was nearly drowned when she lost her grip on the life ring as the injured crewman was retrieved.

Weckback was acknowledged by a standing ovation from the audience, and Assistant Administrator William Hogarth presented her with the U.S. Department of Commerce Certificate of Recognition for Heroism and Bravery.

PANEL SESSION 1

What Is the Best Mix of Observer Presence and Compatible Technologies?

Moderator: Bob Pride, eBusiness Solutions, Inc., Newport News, Virginia, U.S.A.
Amos Barkai, OLRAC, Tokai, Cape Town, Republic of South Africa
Sally Bibb, NOAA Fisheries Alaska Region, Juneau, Alaska, U.S.A.
Mark Buckley, Digital Observer Project, Kodiak, Alaska, U.S.A.
Todd Dubois, NOAA Fisheries Enforcement, Gloucester, Massachusetts, U.S.A.
Janell Majewski, NOAA Fisheries Northwest Fisheries Science Center, Seattle, Washington, U.S.A.
Bob Mikol, OceanLogic, Juneau, Alaska, U.S.A.
Shawn Stebbins, Archipelago Marine Research, Victoria, British Columbia, Canada

OLFISH: Commercial Electronic Fishery Management System: A Demonstration of a Unique, Wheelhouse, Electronic Solution for the Collection, Management, Presentation and Utilization of Commercial Fishing Data

Amos Barkai, OLRAC, Tokai, Cape Town, Republic of South Africa

Barkai described an electronic fishery data management system named OLFISH that captures, stores, and summarizes fishing data. It can be used by skippers, managers, and scientists during fishing operations and for scientific surveys to provide a comprehensive, user-friendly means of compiling data reports.

OLFISH eliminates the need for paper logbooks. Data can be entered at the trip, day, or fishing activity levels. Catch information can be recorded in real time as fish or as weight caught, or in summarized form with a full breakdown of product grades and packing information. OLFISH records fishing gear used, environmental data, and other relevant information relating to the catch data. Geographic position system (GPS) readout is captured for date, time, and location. Data browsing uses an "intelligent" data tree structure to view all data entered at all levels of resolution. Data can be viewed, printed, and edited (provided the user has the relevant security key). A database management utility allows each company to customize OLFISH to its needs and specifications, and to create a set of predefined data lists to minimize keyboard usage and control data consistency and accuracy.

OLFISH contains a number of data reporting and data summarizing facilities; each report can be printed or exported as a text or Excel file, or can be automatically sent to the Mapper for spatial viewing. Any data captured by OLFISH can be displayed by the Mapper, a built-in geographic information system (GIS) utility for overlaying user-defined geographical displays of fishing performance and environmental and physical data. An "observer manager" utility allows an observer program manager to allocate observers and tasks to vessels and to see the locations of observers and vessels at any time. Previous activities or records can be recalled. The year planner is a calendar-like summary of annual fleet activities, including fishing and non-fishing days and daily catches.

Observers and Technology: A System for Monitoring Quotas in the Western Alaska Community Development Quota Fishery

Sally Bibb, NOAA Fisheries Alaska Region, Juneau, Alaska, U.S.A.

Accurate and timely observer data are instrumental to managing fisheries that provide about $40 million worth of economic development assistance each

year to the residents of western Alaska villages. The Western Alaska Community Development Quota Program was established under the Magnuson–Stevens Fishery Conservation and Management Act to allocate a portion of the 29 groundfish and 7 prohibited species quotas in the Bering Sea and Aleutian Islands area to 65 western Alaska villages. The program assists these villages in developing commercial fisheries-based economies. The quotas are harvested by community residents, or by vessels owned by the community development quota groups, or are leased to other commercial fishermen who pay the groups a royalty.

Each community development quota group manages its fisheries so that it does not exceed any of its quotas for over 40 different groundfish and prohibited species. The community development quota groups must use observer data for quota accounting, thereby ensuring an independent source for estimates of all catch, including discards. Each community development quota haul, set, or delivery must be observed (with limited exceptions), so two observers are required on catcher/processors. Most observers must have prior experience and additional training, and have received acceptable ratings on their most recent deployments. Improved and standardized tools for observer sampling include sampling stations for the observers, communications equipment and NMFS software to transmit observer data to NMFS each day, motion-compensated scales to weigh samples, and, in the case of trawl catcher/processors, motion-compensated scales to weigh the total catch. The observer data are made available electronically to vessel and community development quota group personnel and to NMFS for close to real-time accounting of catch.

Video Monitoring: An Alternative Technology

Mark Buckley, Digital Observer Project, Kodiak, Alaska, U.S.A.

Video monitoring, in lieu of deploying human observers aboard selected fishing vessels, has already gained regulatory acceptance in some of western Canada's longline fisheries. An Alaska-based group, the Digital Observer Project, is seeking to introduce video monitoring technology to U.S. fisheries to supplement or replace some human fisheries observers with a combination of cameras, computers, sensors, and custom software. Digital Observer has been testing and developing hardware and software systems that will facilitate shipboard data gathering and automate shoreside data analysis.

A sample shipboard configuration includes a continuous time-lapse mast camera to view the working deck, a computer-activated over-the-side camera to collect moving images of the roller when hauling gear, a motion-detector-activated bird camera to collect time-lapse images of deployment when setting gear, and a motion-activated hook counter activated when setting gear. The "Alaska" camera housing is stainless steel, heated, positive air pressure, tamper proof, and equipped with a built-in wiper with automatic wiper activation. A central server computer system running custom software is inside a locked box and includes removable hard disks, uninterrupted power source, power backup, a power failure alarm, a geographic position system (GPS) link, hydraulic pressure sensors, and motion-detector magnets in the drum/block. This system is supported onshore by a computer with image-recognition and other software to (1) facilitate the extraction of data from the removable hard drives coming from vessels, (2) automate report generation, and (3) perform tracking that allows the image recognition software to "learn" from its mistakes. Future technology challenges include development of machine vision software to "compress" time and to perfect camera and sensor systems that will work flawlessly outdoors at sea in all seasons and climates. Digital Observer expects its advanced data analysis technology will be ready for deployment in two or three years.

Hawaii's Western Pacific Regional Fishery Management Council has also invited the developers to Hawaii for pilot demonstrations of video systems to monitor fishery interactions with endangered Hawaiian monk seals. There are few seals left and the remainder are widely dispersed, so fishermen can go weeks between sightings. This may be a candidate for machine vision and image recognition, since there are no other pinnipeds in the area, and infrared images may provide a thermal profile unlike that of cetaceans, birds, or floating objects.

Vessel Monitoring Systems (VMS) Technology in the Northeast U.S.: Current Uses and Future Trends

Todd Dubois, NOAA Fisheries Enforcement, Gloucester, Massachusetts, U.S.A.

The Vessel Monitoring System (VMS) in the northeastern United States was originally implemented in 1998 to accurately account for scallop fishing vessel "Days at Sea." VMS also emerged as a significant tool in protecting areas closed to fishing (closed areas). Currently, the Northeast VMS system monitors 366 scallop, multispecies, and herring fishing vessels by providing near real-time location information to NOAA (approximately 400,000 position reports per month). The capability and accuracy of vessel monitoring system (VMS) technology has been determined to be scientifically reliable in court prosecutions of closed area cases. The recovery of the New England scallop fishery has been attributed to effort reduction and successful management of the scallop stocks in these closed areas. Vessel monitoring system (VMS) technology has been critical in the protection of these areas and is expected to play an increasing role in other fisheries management plans in the near future.

System components include mobile communications service providers who own the geostationary reference satellites, mobile transceiver units aboard the vessels, vessel monitoring database and base stations, and the NMFS system architecture. The most common mobile transceiver unit is currently the Qualcomm OmniTracs (352 in Northeast fisheries). Each device costs $5,800, and communication costs are $2 per day. Thrane & Thrane 3022D units using INMARSAT-C satellites have been approved for highly migratory species longline and submitted for review in other Northeast fisheries. These devices cost $2,650, and communications cost $1 per day.

In addition to providing accurate positional information, vessel monitoring system (VMS) units provide two-way communications between equipped vessels and NOAA. Two-way communication is beginning to take on a larger role in northeastern fisheries management by allowing compliance messaging, Coast Guard data feeds, and harvest reporting to occur while at sea. In a limited number of fisheries, catch data are being submitted to NOAA on a daily basis through the vessel monitoring system (VMS) units. The units are constantly monitored by field enforcement staff that can locate vessels, send messages, and verify logbooks. With a growing number of fishery management plan alternatives identifying the need for increased observer data and more timely reporting of harvest information, the two-way communication afforded by VMS may also fill a critical technological need of fisheries managers. Current proposals being raised in Northeast fisheries include expansion of the vessel monitoring system (VMS) monitoring to 1,800 additional fishing vessels, electronic reporting by vessels and dealers, and increased observer coverage by up to 10%.

Initial Applications of an Electronic-Monitoring System to the West Coast Groundfish Observer Program

Janell Majewski, NOAA Fisheries Northwest Fisheries Science Center, Seattle, Washington, U.S.A.

Archipelago Marine Research placed a video monitoring system on one vessel participating in the shoreside Pacific whiting fishery during June 2002 as a pilot project. The unit was onboard for 15 days and recorded 16 fishing events. It may be possible to use a video monitoring system in this fishery due to the full retention requirements, the generally low volume of bycatch, and the rarity of discarding events. In this instance, the cost of placing an observer onboard far outweighs the amount of information that will be collected. Components of the system included an operating system and data storage unit that linked two cameras, a geographic position system (GPS) receiver, a winch sensor, a hydraulic pressure transducer, and an operator interface (Figure 4). Output included a complete timed record of fishing events (doors in/out, codend start/finish, hydraulic pressure, and winch rotation events), vessel speed and heading, and a video record of deck activity. Although unexpected, one discard was recorded.

This pilot project showed that a electronic monitoring system could be a cost effective alternative to observer coverage in the shore-based Pacific whiting fishery and other fisheries where monitoring for compliance of full retention is the goal. Additional study is needed to assess the value of discard estimates made by video monitoring to stock assessors, and the feasibility of broadening this monitoring to a wider segment of the fleet.

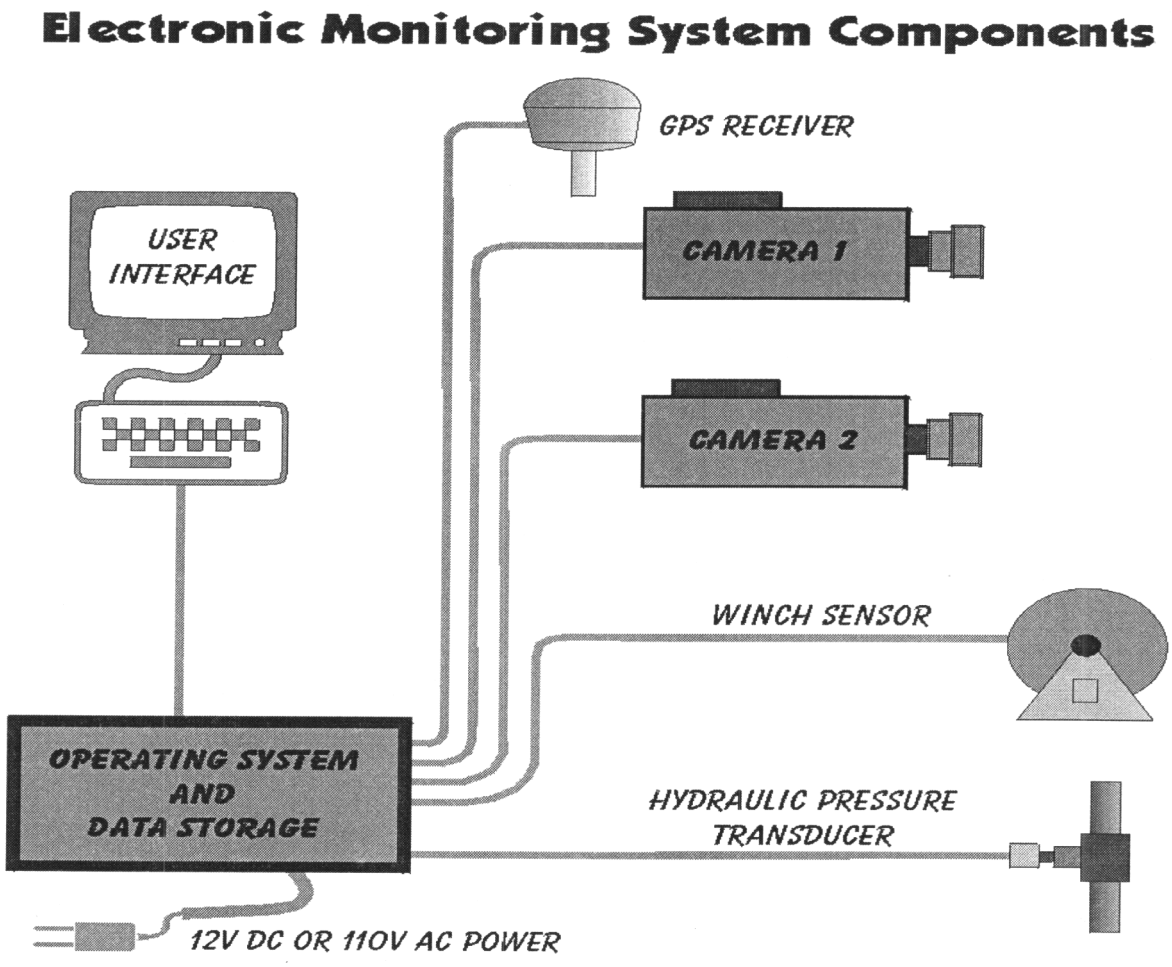


Figure 4. Set-up of Electronic Monitoring System (EMS).

Video monitoring may also be useful when vessel characteristics make it impossible to place an observer on board. Many vessels in the West Coast fleet are small, and some are unsafe. As we increase coverage in the open-access fleet, vessel size and safety become even larger issues. Smaller vessels will not receive appropriate observer coverage if we do not find a reliable alternative method to placing an observer onboard.

Electronic Logbooks in North Pacific Fisheries

Bob Mikol, OceanLogic, Juneau, Alaska, U.S.A.

Fishermen are accustomed to collecting and recording primary harvest data and potential compliance information in paper logbooks. By the time NMFS personnel key these data into a primary database, the potential for introduced error has been introduced several times. OceanLogic developed its electronic logbook by examining the paper forms to identify those sections that never, sometimes, or often change. In a properties and setup section, repetitious (vessel) data are captured and automatically passed to lower (trip, haul) levels as needed. Event entry (start/end trip, start/end fishing event) is accomplished with a single keystroke, which initiates automatic poling of the vessel's geographic position system (GPS) unit for date/time and position. After each haul, the operator can enter the bottom depth, gear depth, estimated haul weight, and target species. A Haul Species form also allows entry of detailed catch composition data. The system generates Daily Fishing Log reports and Discard reports that meet current federal reporting requirements; these reports can be transmitted electronically to NMFS or can be used by the operator

with navigation chart packages. By displaying harvest and discard graphically, the system enables vessel operators to identify the best fishing areas and maximize effort. Use of these electronic systems is important to observers because it encourages good data collection by all parties.

A Case Study to Compare Electronic Monitoring and At-Sea Observer Data

Shawn Stebbins, Archipelago Marine Research, Victoria, British Columbia, Canada

The Canadian government requires the halibut longline fishing industry in British Columbia to provide and fund independent at-sea monitoring of its fishing operations. Under an individual quota management system, 212 active fishing vessels harvest a quota of 2.1 million pounds. The fishery averages 1,000 landings per year using hail-in/hail-out procedures, and there is 100% independent dockside monitoring. The target at-sea coverage level in 2002 was 20% to 25% of fishing days. The at-sea monitoring requirement was fulfilled through a combination of 15% coverage (200 trips = 1,400 days) by observers and 10% coverage (100 trips = 900 days) by Electronic Monitoring equipment. Archipelago Marine Research, a contractor, provided this service to the industry's Pacific Halibut Management Association. The electronic monitoring option offered a lower-cost alternative to an at-sea observer and allowed monitoring to occur on smaller vessels that may be unsuitable to host an observer. During the first year of the electronic monitoring service for the halibut fishery, Archipelago conducted a study to compare both at-sea monitoring methods to assess the accuracy of data provided by each method (hook-by-hook and bridge log/catch data creation), compare costs, develop the government's confidence, and gain industry acceptance.

At-sea observers were deployed on about 50 fishing trips along with the electronic monitoring units to collect parallel fishing catch and effort data sets. The EM system included a "black box" automated data recorder, a sensor array (global positioning system-GPS, winch rotation, hydraulic pressure, two closed-circuit cameras), and a user interface. Data output included a sensor suite time series, position and activity mapping, and digital video catch monitoring. Video data were analyzed by a shore-based technician who provide data for catch comparison.

The fishery closed on November 15, and a total of 459 sea days with 697 usable sets were monitored with electronic monitoring. Paired observations were obtained for 289 sets, allowing 92,363 hook-by-hook comparisons, 35,000 of these with catch. Preliminary results suggest greater than 90% overall agreement on paired catch data, variable by species. The overall pooled catch (pieces) showed only a 2% difference. The estimated cost of electronic monitoring was only half that of observer coverage.

Questions and Panel Discussion

Dubois stated fishing activity does change the patterns seen from vessel monitoring system (VMS) units. Although vessel monitoring systems (VMS) do not have hauling/setting sensors, the units are poling constantly, so vessel position can be determined over a long period of time. Changes in speed can be detected if poling is sufficiently frequent. Dubois suggested that monitoring such changes may not be an enforcement concern, and may instead be handled by the observer program. When asked whether the NMFS software may be shared with the ATLAS program, Dubois noted that confidentiality issues may present a problem, but compatibility should not be a problem for the program itself. Dubois was unable to comment on the status of a vessel monitoring system (VMS) case that had been challenged.

Mikol was asked whether space concerns may discourage some vessels from adopting an eLog system. He noted that the system was developed in conjunction with fishermen, and that most vessels have enough room to accommodate either a desktop computer or laptop. Weatherproof models are also available. OceanLogic intentionally avoided the use of mouse or track ball functions in its eLog system due to anticipated space concerns. Dubois noted that space is sometimes an issue with VMS units on small vessels, but that it is more important for the unit to be near a power source than in the wheelhouse.

Panelists were asked about the size of video files and the feasibility of transmitting them via satellite. Buckley noted sensor data can be stored on floppy

discs, but video images present a more significant problem. Video files are huge, and the number of recording days that can be stored depends on the capture rate (which can range from 1 frame per 10 seconds to 2 or 3 frames per second); a typical 30 to 50 gigabyte hard drive can usually store 7 to 30 days of video records. It is not practical to send these data via available communications technology. Digital Observer is currently attempting to use compression algorithms to increase storage capacity.

An audience member noted that VMS is a useful tool and that the two-way communication option provides a reassuring link for observers. Since this option is more expensive, however, he was interested in the factors fishery managers consider when deciding what type of system to require. Dubois noted that requirements vary nationwide. The Northeast region requires two-way communication capability, but other regions do not.

Majewski was asked whether enforcement action was taken in the discard case recorded during her pilot project. She replied that although full retention is required, there can be safety exemptions. The pilot program was designed to investigate the feasibility of video as a monitoring tool and not its application in enforcement actions.

Panel members were asked how crew cooperation could be obtained, given the fact that this cooperation is essential for most remote monitoring technology to function. They agreed that the only way to achieve buy-in was to make any data collected available to the fishing company. Fishermen are more likely to accept technology that is placed on their boats if they derive some benefit from it.

PANEL SESSION 2

How Do Observer Programs Achieve Optimal Coverage?

Moderator: Dave Kulka, Canada Department of Fisheries and Oceans, St. Johns, Newfoundland, Canada
Joe Firth, Canada Department of Fisheries and Oceans, St. Johns, Newfoundland, Canada
Dan Ito, NOAA Fisheries Alaska Fisheries Science Center, Seattle, Washington, U.S.A.
John LaFargue, NOAA Fisheries Northwest Fisheries Science Center, Seattle, Washington, U.S.A.
David Potter, NOAA Fisheries Northeast Fisheries Science Center, Woods Hole, Massachusetts, U.S.A.
Sue Salveson, NOAA Fisheries Alaska Region, Juneau, Alaska, U.S.A.

Achieving Optimal Coverage? Operational Issues: A Newfoundland Perspective

Joe Firth, Canada Department of Fisheries and Oceans, St. Johns, Newfoundland, Canada

The Fisheries Observer Program of the Department of Fisheries and Oceans Canada (DFO) – Newfoundland Region has a dual mandate. Observers are tasked with monitoring regulatory compliance at sea and collecting biological and technological data for managers and scientists. Coverage levels are set nationally, and along with deployment strategies are driven by enforcement and fisheries management. Data collection has often been opportunistic, but the program is trying to implement more science-based deployment strategies. Optimal coverage is the level at which stated objectives are met cost-effectively, and an optimal coverage plan must consider both the level of coverage and the deployment strategy. Programs with a dual mandate must recognize that optimal coverage levels and deployment strategies for each may be different. Enforcement employs a strategic deployment strategy based on the likelihood of non-compliance, while data collection requires random deployment. Operational issues can confound optimal coverage and should be addressed when setting and implementing coverage levels that include large geographic areas and complex fisheries, complicated funding mechanisms (e.g., direct billing, pooled funds), roles and responsibilities for deployments that differ throughout the region, unanticipated vessel departures when hail-outs are not required, and the "oops" factor. The latter can include any number of unplanned events, such as the price increase that produces an ensuing increase in observable fishing activity and effectively draws resources from other areas. Firth reminded listeners of Karp's 1998 admonition that data users recognize the limits and weaknesses as well as the merits inherent in observer programs, and appreciate how scientific and regulatory objectives may conflict. He also cautioned listeners not to set their standards too low.

When Is a Sampling Design Not a Sampling Design?

Dan Ito, NOAA Fisheries Alaska Fisheries Science Center, Seattle, Washington, U.S.A.

Observer programs are a mechanism to collect high-quality data that are essential for management. Sampling by observers is a three-step process that includes fleet level (i.e., between-vessels – the proportion of the fleet observed), vessel level (i.e., within-vessel—the proportion of a vessel's hauls or sets sampled by the observer), and haul level (i.e., within-haul/set—the proportion of each haul or set sampled by the observer). An arbitrary selection of vessels could help gather some preliminary data to give an analyst some measure of variance, but would not be consistent with a sampling plan and

should not be considered a viable long-term plan. Arbitrary vessel selections could be indicative of no overall sampling design. If the vessels have a role in selecting deployments, there are likely incentives for them to fish in ways that will not be personally detrimental.

Current observer coverage in the North Pacific must be 100% for vessels greater than 125 feet long and 30% for vessels 60 to 125 feet long; no coverage is required for vessels less than 60 feet long. Similar coverage levels are required for shoreside plants processing more than 1,000 tons per month, 500 to 1,000 tons per month, and less than 500 tons per month. The choice of when to take partial coverage is at the vessel owner's or operator's discretion. In part, this "design" was a temporary measure to obtain some coverage of this fleet. It has evolved into a long-term program, with management decisions based on the data collected from these vessels.

Total (100%) coverage is equitable across the fleet and provides an opportunity to collect large amounts of data and good coverage for compliance monitoring. Unfortunately, true 100% coverage may require more than one observer on each vessel, is expensive, may not be feasible for small vessels, and may be unnecessary for purely scientific purposes. No coverage has the advantage of low cost, but it provides no catch or biological data, no onboard compliance monitoring, and is not equitable when compared with other observed components of the fleet.

Partial (30%) coverage is cheaper than full coverage, more feasible for smaller vessels, and may provide sufficient coverage for routine scientific sampling. However, it is a highly likely that there will be differences in vessel behavior on observed and non-observed days, data may be biased for a variety of reasons due to non-random placement of observers, there may not be enough spatial or temporal coverage for special scientific programs, and coverage may be inequitable across the fleet. Alternatives to the existing model could include direct control by managers over the coverage level, timing, and placement of observers; increased use of logbook data to cross-reference with observer data and extrapolate to the unobserved component of the fishery; alternative approaches to monitoring fishing activity (e.g., VMS, video monitoring, electronic logbooks, fish recognition software); and expanding observer coverage to vessels less than 60 feet long.

West Coast Groundfish Observer Program Protocol for Vessel Selection

John LaFargue, NOAA Fisheries Northwest Fisheries Science Center, Seattle, Washington, U.S.A.

Approximately 325 limited-entry permits (250 trawl and 75 fixed gear) are active in the West Coast groundfish fishery, and another 1,500 vessels participate in open-access fishery openings. Limited entry vessels operate coastwide from Bellingham, Washington, to Santa Barbara, California under a two-month trip limit management regime, with cumulative trip limits per permit.

The goals of the West Coast Groundfish Observer Program vessel selection process are to get optimal coverage of the target limited entry fleet, reduce the "observer effect" where vessels fish differently when an observer is present, and minimize selection bias. Each vessel is assigned to a port group based upon the most common geographic location of its landings. Permits are sorted by port group, assigned a random number, and then ranked within each port. Selected vessels are required to take an observer on all trips in the upcoming trip-limit period (2 months). Permit holders receive written and verbal notification of their selection, and coordinators/observers conduct follow-up checks on safety and sampling space. Once a vessel has completed its observer coverage obligation, it is moved to the bottom of the list for the next selection process. This procedure allows the Observer Program to distribute observer effort along the coast, placing more observers in those port groups with more fishing effort. During this first year of the program, most of the active trawl permits have been covered.

Optimal Observer Coverage

David Potter, NOAA Fisheries Northeast Fisheries Science Center, Woods Hole, Massachusetts, U.S.A.

When trying to determine what constitutes optimal coverage, first ask why this particular fishery is being observed. Coverage may be mandated by some management plan. If total (100%) coverage is required, the task is easier because everyone must comply, but it is also likely to be expensive. Percen-

tage rate coverage (5, 10, 20%) is less expensive but is harder to accomplish. The specific percentage rate, the selection process, what to do about refusals, and enforcement concerns all become issues of concern.

If the coverage is necessary in response to a Marine Mammal Protection Act concern, its goal will be to obtain statistically reliable estimates of mortality or serious injury, determine the reliability of fishers' self-reporting, and/or identify changes in methods or technology that may increase or decrease mortality or injury. If this coverage is also intended to observe fishery discard or fish bycatch, coverage levels may or may not increase and it may be impossible to conduct both simultaneously.

Knowing why the fishery is being observed will identify whether the event you wish to observe is rare. If the occurrence rate is unknown, it is best to start with high coverage rates, determine the rate, and adjust coverage to maintain statistical reliability. If the event is rare but significant (e.g., an Endangered Species Act take), higher coverage levels may be warranted to avoid missing too many of these events.

If the observer data act as a management trigger (e.g., for time/area closures), determine what level of events (or missed observations) is acceptable. Coverage levels to protect an endangered species are likely higher than those needed to protect a spawning stock. Avoid "rules of thumb" or arbitrary percentages when allocating resources because the coverage needed depends on sample size. For example, a 5% coverage rate may be adequate in a large fishery but not in a small one. It is better to base sample sizes on a targeted coefficient of variability for a mortality estimate if the data are available, or on the binomial probability of observing a specified number of mortalities if they are not (e.g., the SEADAYS computer program by Paul Wade, NMFS, Seattle).

Integration of Observer Data into Science, Fishery Management, and Compliance Monitoring Programs in the North Pacific Groundfish Fisheries

Sue Salveson, NOAA Fisheries Alaska Region, Juneau, Alaska, U.S.A.

The fishing vessels and processors participating in the North Pacific groundfish fisheries off Alaska currently pay for nearly 37,000 days of observer coverage annually at a cost of about $13 million. This coverage generally is distributed throughout the fishing fleet and at-sea and shoreside processors, based on vessel size category or quantity of fish processed during a month. The existing level of observer coverage in the North Pacific groundfish fisheries is not predetermined based on a quantitative assessment of scientific data needs; it was originally conceived as a pragmatic approach after looking at landing levels in various vessel classes. In fact, coverage levels generally surpass those needed to collect basic scientific data on size and age distribution of groundfish species catch for annual stock status assessments and other research (Figure 5).

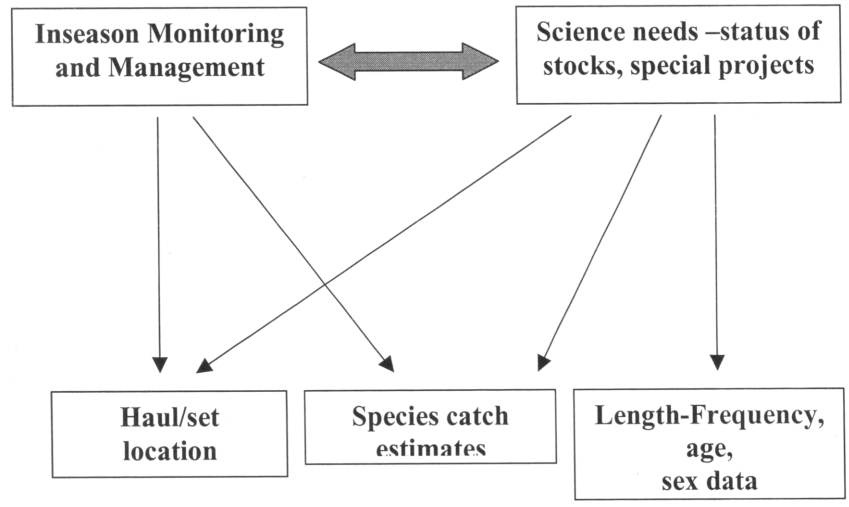


Figure 5. Observer Data Used for Management and Science.

The level of coverage in the North Pacific fisheries has been fairly static since the early 1990s and has been acceptable for purposes of fleet-wide monitoring of fishery quotas. Nonetheless, harvests by the various vessel classes have changed in the past decade, and coverage levels have not changed to reflect this new reality. Despite the fixed regulatory coverage rates, actual observer coverage rates by fishery range between 30% and 80% in the Bering Sea/Aleutian Islands and between 5% and 55% in the Gulf of Alaska. NMFS also recognizes that its Alaska quota management will be more accurate with greater levels of coverage for a fleet and fishery.

Recently evolving objectives for new fishery management programs that strive to rationalize overcapitalized fisheries through individual or fishery cooperative harvest allocations have driven observer coverage to levels and standards higher than necessary to meet compliance and enforcement needs. This trend has increased reliance on observer data for monitoring catch and management of quotas. Management and compliance monitoring requirements will probably continue to drive observer coverage levels in the North Pacific fisheries in the foreseeable future. Future changes to observer coverage could include increased coverage of the 30% fleet (vessels 60–124 feet long) and those vessels less than 60 feet long, a pilot program to link electronic logbooks with deployment of observers to areas actually fished, and more accurate extrapolation of observed catch data to the unobserved fleet.

Questions and Panel Discussion

Kulka noted that many observer programs are burdened by a long history over which they have acquired many objectives. The challenge for these programs is determining how to meet these objectives while minimizing costs. The message he drew from panel presentations is that determining optimum coverage is hard, but achieving it in an operational sense is even harder.

The panel was asked whether the observer data collected are valuable when coverage is reduced due to limited funding. They replied that it is important to understand the limits of the data. Something is generally better than nothing if it is used appropriately.

The audience noted that all observer programs have multiple objectives and asked whether there might be an objective way to weight them. The panel could not answer definitively, but cautioned that coverage levels designed to monitor a single species may be inadequate if multi-species or fishery monitoring is attempted as well. It may be necessary to increase coverage to do both.

The audience asked what would constitute a good target coefficient of variation. Potter replied that it should be as low as practicable, and a coefficient of variation of 20% to 30% may be adequate. Lowering the coefficient of variation requires an increase in effort, and programs that fail to achieve enough sea days will see their coefficient of variation increase. Panel members noted that in some instances (e.g., the North Pacific) the desired coefficient of variation has never been articulated by policy makers. The North Pacific was cited as an example of a legacy program to which layers have been added over time. Arbitrary coverage levels are specified in management plans, the objectives to be achieved are often unclear, and users rarely specify the coverage levels needed.

The audience noted the difficulties associated with extrapolating data to unobserved vessels and asked how enforcement is factored into planning when coverage is less than 100%. In the northeastern U.S., the observer program does not function in a compliance mode. The scientific data collected by the program are available to enforcement agents, but the program is not proactive in sending data to enforcement. In Canada, programs with dual mandates might increase coverage beyond the levels that would be specified by a CV for purely scientific purposes. In other instances, vessels might be targeted for strategic observation based on the degree to which landings were different when they were unobserved. Partnerships with shore-based sampling programs are necessary to determine how the presence of an observer affects behavior.

A U.S. observer maintained that the quality of data collected by experienced observers is generally better, and questioned why observer experience is never factored into coverage levels. Representatives from the North Pacific program replied that data quality is evaluated at every debriefing, regardless of the observer's experience. Others noted that some experienced observers do not always provide data of good quality. DFO representatives acknowledged that they can only accomplish a limited amount in training and that much of an observer's skill is

acquired on the job, but concluded it would be difficult to factor experience into coverage levels. It would be impractical to simply increase sea day requirements when observers are inexperienced. Panelists recognized that retention is a problem in all observer programs, citing the rigors of the job and the career aspirations of many observers. While a variety of interview techniques can be used to improve retention, panelists believed that many observers simply want the experience and do not consider observing a long-term career.

Several questions from the audience addressed the burden of observer coverage on the fishing industry. One noted that incremental costs of VMS text messaging and a variety of economic factors (low prices, rising insurance costs, reduced sea days) are all reducing profitability, and wondered how coverage could be increased without increasing economic burdens on the fleet. Northeast regional representatives replied that while there is an initial entry cost for text messaging capability, the recurring costs are not large. They also recognized that the commercial fleet in that region is probably 30% to 40% above its carrying capacity and that it will undoubtedly be difficult for many to survive. Other audience members questioned whether society could afford less than 100% coverage if that was the level required to protect the fisheries resource. Salveson noted that any changes in coverage levels in the North Pacific must be reviewed in a public process; the fishery management councils strive to balance costs to industry against essential data needs.

A fisherman with no college degree complained that he was unable to find work as an observer despite 25 years of fisheries experience; he maintained that many fishermen had college degrees or the equivalent and should be given opportunities as observers if their fishing livelihoods were being taken away. Northeast representatives noted that college degree requirements can be waived, but North Pacific representatives defended their degree requirement on the basis of data quality (e.g., the need for observers to understand statistics and random sampling). Other panelists recognized the benefits of fishing experience to an observer, but cautioned that not all fishers could be unbiased observers of other fishers.

PANEL SESSION 3

What Is the Observer's Role in Violation Situations?

Moderator: Joe Kyle, Pacific Associates, Juneau, Alaska, U.S.A.
Ernesto Altimarano, Inter-American Tropical Tuna Commission, San Diego, California, U.S.A.
Gary L. Graham, Gulf and South Atlantic Fisheries Foundation, West Columbia, Texas, U.S.A.
Kevin G. Heck, NOAA Fisheries Office for Law Enforcement, Anchorage, Alaska, U.S.A.
Ronald Manderson, Canada Department of Fisheries and Oceans, Moncton, New Brunswick, Canada
Garland Walker, NOAA General Counsel for Fisheries, Juneau, Alaska, U.S.A.
Steve Warner, Institute for Defense Analyses, Alexandria, Virginia, U.S.A.

The Role of the International Observer Program in the Inter-American Tropical Tuna Commission and the Agreement on the International Dolphin Conservation Program

Ernesto Altimarano, Inter-American Tropical Tuna Commission, San Diego, California, U.S.A.

Since the early 1960s, the purse-seine fishery for tunas in the Eastern Pacific Ocean has caused substantial mortalities of certain species of dolphins. After the NMFS started an observer program in the early 1970s to study the problem for the U.S. fleet, the member nations of the Inter-American Tropical Tuna Commission agreed to a similar program that began monitoring the international fleet in 1979. The Inter-American Tropical Tuna Commission staff has used the observer data to work with government agencies, industry representatives, and fishermen in identifying, preventing and avoiding the causes of mortality. These efforts resulted in a reduction in the estimated mortality from over 100,000 in 1986 to approximately 15,000 in 1992 (Figure 6). That year ten nations involved in the fishery agreed to a voluntary accord, the La Jolla Agreement, with goals to further reduce the mortality of dolphins. The Agreement included requirements for dolphin safety gear and procedures. It also called for 100% observer coverage of vessels over 400 short tons carrying capacity. The observed mortality in 1993, the first year of the La Jolla Agreement, was 3,601 dolphins.

In 1999 the La Jolla Agreement was replaced by a legally binding accord, the Agreement on the International Dolphin Conservation Program. The observed mortality in 2001 was approximately 2,100 dolphins. The Agreement on the International Dolphin Conservation Program observers do not take direct actions on possible infractions that occur during fishing operations.

The International Review Panel is a body created under the La Jolla Agreement that includes representatives of the signatory nations, the fishing industry, and the environmental community. The International Review Panel meets three times each year to analyze observer trip reports and identifies infractions through systematic reviews of the observers' data. In these reviews, the names of vessels and their respective flags are not identified. Possible infractions that have been identified are referred to the pertinent party for further investigation. A party may require the presence and testimony of the observer. If observers are on subsequent assignments, the process may be delayed until their return. Recent proposals would require observers and vessel operators to sign documents that establish the legal status of the observer reports, originally designed for scientific purposes only. Each party is required to report its findings to the rest of the parties through communications to the Inter-American Tropical Tuna Commission, which acts as the Secretariat to the Agreement on the International Dolphin Conservation Program.

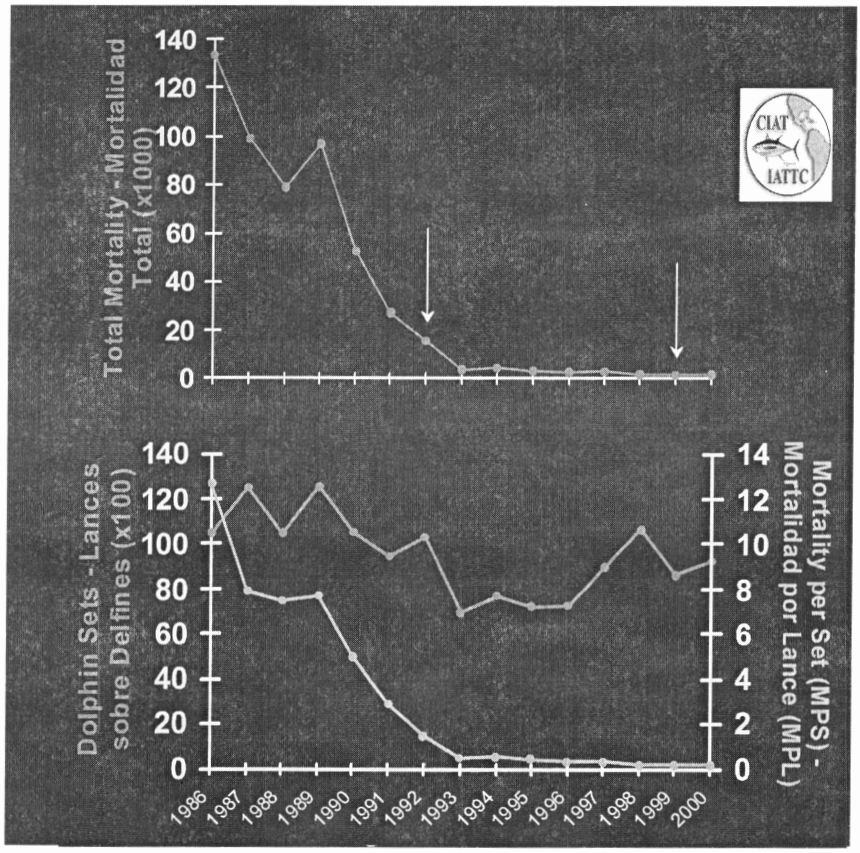


Figure 6. Dolphin Mortality from 1986-2000.

Thoughts Regarding the Observer's Role in Data Collection vs. Violation Situations

Gary L. Graham, Gulf and South Atlantic Fisheries Foundation, West Columbia, Texas, U.S.A.

The Gulf and South Atlantic Fisheries Develop-ment Foundation, Inc., has over a decade of observer program experience from its work in collaborative research and data collection programs with its fishing industry cooperators. The work is often conducted aboard small to mid-sized trawl vessels that operate primarily in the Gulf and South Atlantic. Trips are often long, quarters are cramped, and a spirit of teamwork is essential.

Data collection is the priority for Foundation observers. If observers are perceived as enforcement adjuncts aboard a vessel, a different psyche is established between them and the crew. Because the Foundation does not work with chronic violators, fishery violations witnessed by the observer program are extremely rare. In those instances where violations do occur the observers are witnesses like anyone else onboard. Observers record data but do not initiate violation actions. The data are not used if they could be skewed because a violation occurred. Fisheries observer's profession often places them in a delicate and potentially contentious environment aboard vessels. Data collection often requires special individuals who can adapt to rigorous conditions, yet maintain scientific integrity through prescribed protocols. The Foundation believes that observers should be perceived as unbiased collectors of scientific data and not as enforcers.

Observers Do Make a Difference

Kevin G. Heck, NOAA Fisheries Office for Law Enforcement, Anchorage, Alaska, U.S.A.

In Alaska the active role of observers in fisheries violations is vital to successful fisheries management. Their mere presence discourages violations. Observers are the eyes and ears of NMFS, and their ability and willingness to recognize and document violations is essential.

In the North Pacific Groundfish Observer Program, observers are required by law to document and report violations. This removes the burden from an observer to decide whether to report a violation; the reporting is mandatory, and the observer does not have a choice. If questioned by a violator, observers can simply respond that they have a regulatory obligation to report everything that occurs. The importance of documenting and reporting cannot be overemphasized and should be included in all regulatory regimes.

North Pacific Groundfish Observer Program observers have done an excellent job documenting and reporting violations. During the last three and a half years, more than 900 violations have been reported to enforcement, and many successful prosecutions have resulted (Figure 7).

The observer's role in violation situations must be clearly articulated by the NMFS. Observers need to understand whether they are required to report violations, how their data will be used by enforcement, and what their role will be in enforcement proceedings. Agencies must adopt strong policies on observers' documenting all violations, even if the observers do not believe the violation warrants making a notation in their logbook or writing an affidavit. In several instances, NMFS has looked through years of observer data for information to support ongoing investigations. What might seem to an observer like an isolated incident or insignificant violation has proven to be valuable years later. Good, detailed documentation is important to ensure the data are preserved to be used immediately or to support an investigation that may be initiated years after the violation occurs. Observers need to know that enforcement will support them in documenting violations and will protect them from harassment and intimidation. Observers do make a difference.

Observers and Violations

Ron Manderson, Canada Department of Fisheries and Oceans, Moncton, New Brunswick, Canada

The role of at-sea observers in violation situations in the Gulf Region of Canada is very formal and structured. Besides collecting data for science and resource management on all aspects of fisheries management, at-sea observers monitor compliance on all trips they complete. From the initial training and onward, at-sea observers are trained on the who, what, where, when, why, and how for any violation situation. They play a very important role in violation situations when on board a vessel. They are often the only witness to a violation; their ability to record and report violations must be clear and accurate. Observers must be prepared from detection to prosecution to document, report, and act as a witness in court for legal proceedings.

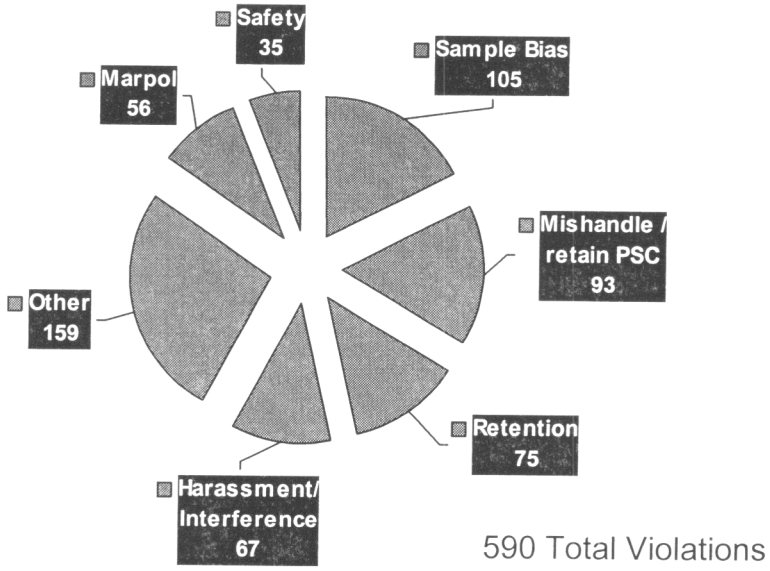


Figure 7. Observer Reported Violations (2000-2002).

Other data collection can be reduced during this process as the complete collection of violation data takes priority. Depending on the severity of the violation, it can be reported when the vessel lands or immediately by telephone. These reports are then passed to DFO Fishery Officers for investigation and laying of charges in court if warranted. Observers must act firmly and professionally at all times. To maintain objectivity and credibility, they are instructed not to consume species that are prohibited under license. Once an observer has been involved in a violation situation, every effort is made to have the violating vessel covered by another observer in future deployments to avoid compromise or placing observers in a position in which they can be harassed for their actions.

A Witness Is a Witness

Garland Walker, NOAA General Counsel for Fisheries, Juneau, Alaska, U.S.A.

Observers perform difficult, grueling, and dangerous work, often as the unwanted passenger aboard fishing vessels. Like any other witness, an observer may play an enforcement role as (1) a witness who may have routine (nonobserver-related) information regarding the violation or crime (e.g., a murder on board the vessel, safety violations and marine casualty, pre-sorting); (2) a witness who experienced the violation first hand (e.g., harassment, intimidation, pre-sorting); and/or (3) the developer/collector of information that may be at issue in a particular case (e.g., regulatory regimes where the observer is specifically designated as the compliance monitor, accurate identification of a particular species).

A good witness is not an enforcement agent, not someone with an agenda (i.e., is detached or unbiased), not blind to reality (i.e., is willing to become involved), but a copious and precise note taker. Prosecuting violations is a slow process. A good witness must be committed and prepared for some inconvenience. Writing an affidavit is only the beginning; prosecutions can take months or years. An observer may be involved in other things by that time, and involvement in court proceedings may represent a real imposition.

Being a witness is not easy, but it may be easier than being an observer. It is important that observers take the time to record violations and to follow up as witnesses if requested. Otherwise, the information they collect will be less reliable and less valuable to fishery managers, and the conditions under which observers collect those data will be less safe for all observers. An unwilling witness means the perpetrators remain free to continue harassing and interfering with other observers.

An Analysis of the Indirect Effect of National Marine Fisheries Service Observers on the Logbook Reporting of Prohibited Species Catch

Steve Warner, Institute for Defense Analyses, Alexandria, Virginia, U.S.A.

The Institute for Defense Analyses study examined prohibited species catch reporting in fishermen logbooks associated with Alaskan fisheries. A basic hypothesis of this research was that the presence of a NMFS observer on board the fishing vessel may influence the logbook reporting of prohibited species catch. Researchers wondered whether the presence of the NMFS scientific observer might serve to deter fishermen, in general, from under-reporting a prohibited species, such as Pacific halibut, during periods where there was at least a perceived incentive to report reduced Pacific halibut prohibited species catch (i.e., fisheries were closed when prohibited species catch limits were exceeded).

Using logbooks associated with a few 1993 Alaskan trawl and hook-and-line fisheries, researchers found evidence that fishermen may have substantially under-reported halibut prohibited species catch. First, they found that more than half of the vessels without an observer present under-reported halibut prohibited species catch by at least a factor of 3 relative to vessels with an observer present. Next, even on vessels that included an observer, some fishermen may greatly under-report halibut PSC relative to an observer's sampled estimates (Figure 8). Finally, there is some evidence that an observer's presence can have a deterrent effect on under-reporting of halibut PSC both during the visit and for a short time afterward. The Institute researchers found that the increase in halibut prohibited species catch reporting associated with an observer's presence was often maintained, at least to a degree, on the ensuing trip that did not include an observer. These estimates should be considered lower bounds because sampling was not random (i.e., illegible, incomplete or missing logbook pages were excluded, so contentious fishers were more likely to be sampled) and

because fishing behavior may have changed (e.g., less fishing, more effort to avoid halibut) with an observer on board.

Since the presence of the observer appears to lead to higher compliance, the researchers suggest that in fisheries that demand active enforcement of logbooks (and possibly other regulations as well), the use of additional observers could allow for fewer at-sea Coast Guard boardings. Presumably, these "saved" at-sea boardings could be focused on other pressing fisheries law enforcement issues.

Questions and Panel Discussion

Kyle expressed appreciation for the work that observers do, and summarized some of the messages of the panel. It is important for the observers to be good witnesses, to fully document violations, to be willing to become involved in prosecutions, and to stay involved for the long haul. The presence of observers can deter violations. A risk of this enforcement role, however, is the risk of jeopardizing the cooperation of the fishing industry.

A representative of the National Observer Program asked how many of the 900 reported violations in Alaska resulted in convictions, and about the extent of initial enforcement training for observers and the frequency of refreshers. Walker replied that there are a range of possible responses to reported violations, including verbal warnings, regulatory reminders, and penalties; he had no statistics on how many cases were actually prosecuted, but assured listeners that all reports received some action. All new observers in the Alaska program receive a three-hour block of training that focuses on major violations and the types of documentation expected; returning observers receive an annual refresher briefing to update them on new regulations. Representatives of the Canadian Observer Program indicated that the response to violations reported in Canada could also range from warnings to court action, and that only 50% to 70% of reported cases go to court. When asked whether fines levied against violators could be funneled into the observer program, Walker replied that under the Magnuson-Stevens Fishery Management and Conservation Act all fines are directed to enforcement. Thus, they indirectly support observers in the field, because observer harassment is one of enforcement's top priorities for prosecution.

A representative of the North Pacific Observer Program asked Walker if he believed it was also

3 Orders of magnitude!

- **Wide variation in reports**
  - Estimated Round Catch Weight (ERCW) from 0.9 to 1,080 mt
  - # of halibut reported from 7 to 5,141

HMT value based on simply summing Halibut PSC and ERCW for all reports

Gear Type	Target Species	Observer = N	Observer = Y	HMT Yes/No Ratio
Trawl	Cod and Soles	3.44	8.68	2.52
Trawl	Cod	3.63	9.96	2.74
Trawl	Soles	2.24	4.32	1.92
Hook & Line	Cod and Sablefish	5.54	20.28	3.66
Hook & Line	Cod	11.16	48.65	4.36
Hook & Line	Sablefish	2.15	5.80	2.69

- Compute individual vessel-based HMT values to reduce variability

Figure 8. Overall Characterization of Data: "Halibut Per Metric Ton" (HMT)

better for an observer to identify with the agency more than a contractor, given the preference noted in his written abstract that observers identify more with the agency than the fishing industry. Walker replied that it is of foremost importance that witnesses testify truthfully. It is best if they are totally unbiased and do not identify with any party. Strong identification with a contractor could create the potential for problems; observers as government employees might be better, but that option is not possible financially.

A NMFS observer asked what support is available to observers, given the length of time between violation and prosecution. Walker replied that the government pays travel expenses, but acknowledged that probably does not cover costs. Counseling is also available for victims of harassment. Prosecutors try to be responsive to questions, but there is currently no process or procedure in NMFS to keep witnesses informed of the disposition of cases in which they may be involved. A NMFS observer stated that labeling observers the "eyes and ears of the agency" implied a spying role, and asked whether observers in Alaska had the latitude to raise the subject of violations with the crew. Heck replied that Alaskan observers were not spies and did indeed have that latitude. He noted that observers were present to collect data, and enforcement information is a part of those data. He stated that cases involving observers only rarely involve a court appearance, and that only in the most severe of harassment cases is the observer apprised of the status of the case on a regular basis.

Altimarano was asked by a National Observer Program representative whether the Inter-American Tropical Tuna Commission had documented cases where observers experienced a backlash after a vessel had been penalized. He replied that backlash could occur in any fishery, but that it does not appear to be a serious issue in the tuna fishery at this time. Since the International Review Panel meets only three times per year, it can often take years between a report and the penalty. The process is a deterrent to violations, because vessel operators do not wish to lose fishing time by being called for an appearance before the International Review Panel. Representatives of the Canadian Observer Program indicated that they had some reports of backlash against observers who reported violations, and that they replaced the observer when this occurred.

A former observer and representative of the North Pacific Training Center who also had experience with excluder testing on shrimp boats agreed with Graham that those research data would have been compromised had he acted in an enforcement capacity. He suggested that in that instance, however, he considered himself to be a biological technician rather than an observer. Graham agreed to consider that suggested change in job title, noting that it might largely be an issue of semantics.

A Canadian Atlantic observer asked whether the DFO could still achieve its long-term goals by using observers only in their role as data collectors and not in their role as bearers of direct witness. Manderson did not believe that the observers' current dual role compromised management data, citing a recent instance of soft shell violations in the snow crab fishery. He believed that both managers and enforcement officers obtained the data they needed, and that the dual role was indeed necessary because agency resources were so limited.

An Alaska Department of Fish and Game representative asked whether any programs had received complaints from the fishing industry about harassment by observers. Altimarano acknowledged that the Inter-American Tropical Tuna Commission does receive complaints infrequently (approximately 5 in the last 10 years). Inter-American Tropical Tuna Commission informs the observer that a complaint has been lodged and begins an investigation, but it has yet to substantiate any of these allegations. Most appear to result from miscommunications. Heck stated that the Alaska program does not receive many complaints; most are unfounded and arise after a vessel has been cited for a violation. He did recall, however, an instance where an observer had harassed another observer.

An Alaska observer asked Warner how long he had been involved in his analysis of bycatch patterns, for whom this research was being conducted, and what office should be contacted to convert his study's recommendations into policy. Warner replied that he had been conducting analyses for the United States Coast Guard since 1991, but that his work for them involving fishing patterns had been confined to the past four years. He suggested that NMFS was the appropriate policy contact.

PANEL SESSION 4

How Are Observer Data Used to Regulate Fisheries?

Moderator: Chris Oliver, North Pacific Fishery Management Council, Anchorage, Alaska, U.S.A.
Sally Bibb, NOAA Fisheries Alaska Region, Juneau, Alaska, U.S.A.
Pierre DeGrâce, Canada Department of Fisheries and Oceans, Moncton, New Brunswick, Canad
Jim Ianelli, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.
Steve Kennelly, New South Wales Fisheries, Cronulla, New South Wales, Australia
Mark Showell, Canada Department of Fisheries and Oceans, Dartmouth, Nova Scotia, Canada
Vanessa Tuttle, NOAA Fisheries, Northwest Fisheries Science Center, Seattle, Washington, U.S.A.

Use of Observer Data for In-season Monitoring of Groundfish and Bycatch Quotas in the North Pacific

Sally Bibb for Galen Tromble, NOAA Fisheries Alaska Region, Juneau, Alaska, U.S.A.

In the federal groundfish fishery off Alaska, over 1,000 vessels using pelagic and non-pelagic trawl, longline, and pot gear target over 60 species to catch over 2 million metric tons annually. There are 335 vessels subject to observer coverage, 89 with 100% coverage and the remainder with 30% coverage. Observer data are an important component of determining total catch weight and species composition. Observer sampling data are used to calculate in-season bycatch rates of about 50 prohibited species that are subject to annual or seasonal quota limits. Thus, observer data are used very directly to determine target and bycatch catch and monitor the fishery's progress toward Total Allowable Catch quotas and prohibited species bycatch limits.

In the community development quota and American fisheries act fisheries, observers sample every haul or set and monitor tests of the scales used to weigh total catch at sea. The catch weights they report are directly used for quota accounting. Data issues include the gaps left by the discretion afforded 30% coverage vessels; statistical applications of these data are limited because observer coverage is not random. Some catch data from 100% coverage vessels also represent unverified vessel estimates. The extensive use of observer data to determine fishery openings and closures presents issues regarding the objectivity of data. The agency must be aware of, and have mechanisms to deal with, the incentives that are created for the industry to act in ways that may bias observer data collections to its benefit.

Using At-Sea Observer Data to Study the Maximum Mesh Size Limit of Snow Crab Traps to Ensure Stock Management Strategy

Pierre DeGrâce, Canada Department of Fisheries and Oceans, Moncton, New Brunswick, Canada

Observers can be used for purposes other than monitoring fishery catch rates, effort, and catch composition. The current minimum mesh size for traps in the southern Gulf of St. Lawrence snow crab fishery is 65 mm (measured between inside knots) but does not have a maximum size limit (Figure 9). Managers recently feared that fishermen had started using wider mesh sizes to catch larger crabs for economic reasons. The annual quota for this fishery is based on an estimate of exploitable biomass (adult males ≥ 95 mm carapace width) obtained by bottom trawl survey. Exclusive harvest of a portion of larger-sized crabs (carapace width > 104 mm) from the exploitable biomass could negatively impact the stock. Selective harvesting of a

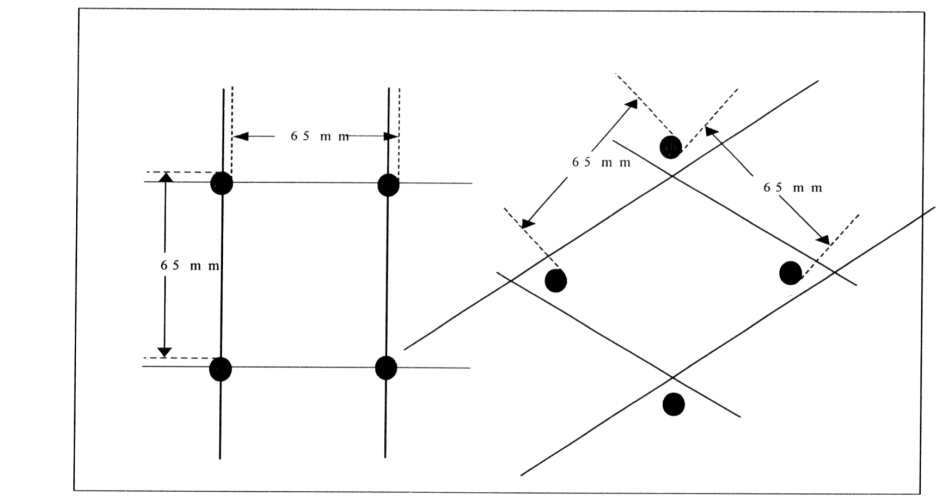


Figure 9. Mesh Measurement–The mesh is measured from the inside of one knot to the outside of the other knot on any one side.

portion of the larger-sized crabs would create an artificial increase of the exploitation rates on the highly reproductive males, resulting in a substantial decrease of the population's reproductive potential. A portion of exploitable stock (those smaller than 104 mm but larger than minimum legal size) that age and die without being harvested would also be wasted.

Managers needed to respond quickly to correct this situation. They analyzed the data collected by at-sea observers during the 2001 fishing season to study the relationship between the size of crab caught and the trap mesh sizes (four mesh size groups of 65, 70, 75, and 80 mm). Based on this study, significant differences were found in crab mean size versus trap mesh size, and crab size structure versus trap mesh size group. The traps with mesh size group larger than 75 mm caught significantly larger-sized crab than those with mesh sizes of 65 and 70 mm (Figure 10). Managers recommended that mesh size should not exceed 70 mm (measures taken from the inside of one knot to the outside of another knot on any one side of the mesh) to avoid selective harvesting of larger-sized crab.

Analyses of Observer Bycatch Data for Evaluation and Design of Fisheries Management Alternatives

Jim Ianelli, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.

Thanks to an extensive observer program, the groundfish fisheries of the North Pacific are successfully managed as multi-species complexes. The managers adhere to single-species quotas based on estimates of bycatch from a wide range of fisheries (defined typically by gear, target species, and areas) and prevent overfishing of these stocks to the extent that the assessment analyses are correct. "Openings" are allowed based on anticipated multi-fisheries bycatch rates, and "closures" occur based on real-time observer catch estimates and fish-ticket data. Careful catch monitoring, while not without problems, appears to work reasonably well for the current array of multiple management objectives.

A recent trend in groundfish management is toward finer-scale practices where annual, relatively large-area quotas are changing to shorter periods and smaller areas. An evaluation of the consequences of alternative management practices (i.e., smaller-scale) for the recent Supplemental Environmental Impact Statement showed that these analyses rarely lead to robust conclusions. The data for this analysis get thin as area and time strata become more

defined, and the results can be driven by "noise," rather than by real patterns. For fisheries, we also know that the species mix is ever-changing, and this exacerbates the problem. Note that analyses leading to the selection of a management alternative are also based on historical data collected under a potentially different set of objectives. These types of issues should be clearly presented to fisheries policy makers to ensure that the "objectives" of management remain firmly based on real data collection possibilities.

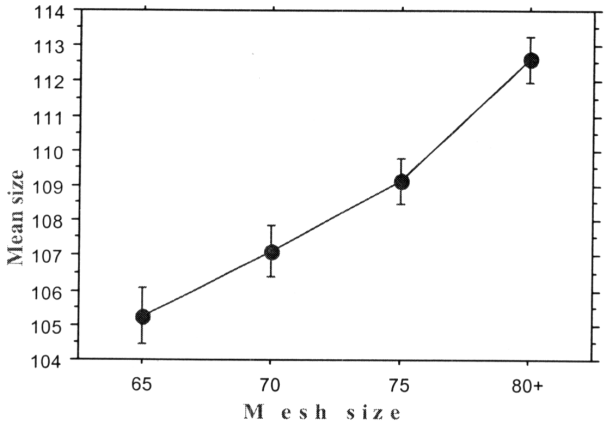
The Role of Fisheries Observer Programmes in Identifying and Reducing Problematic By-catches in Australia

Steve Kennelly, New South Wales Fisheries, Cronulla, New South Wales, Australia

The first prerequisite for any attempt to reduce unwanted bycatch in fisheries is accurate information on the species, quantities, sizes, locations, and timing of problematic bycatch. Such information not only facilitates the identification of any spatial and temporal closures to fishing designed to reduce bycatch, but also provides fishing gear technologists with information required to develop modifications that reduce bycatch while maintaining catches of the targeted species. Several methods are available to quantify bycatch and discards (e.g., questionnaires, interviews, logbooks and samples from fishers, data from research vessels). Nevertheless, onboard observers are considered to be the most accurate way to estimate discards and bycatch. If the survey design, sampling frequency, and range of the observer program are adequate (randomization, stratification, replication), the data gathered can be used to estimate species- and size-specific catches and bycatch by the whole fishery across the spatial and temporal scales required for subsequent bycatch reduction programs.

Kennelly presented the shrimp fishery of New South Wales as a case study. While some of the bycatch is retained (e.g., slipper lobsters, squid), the juveniles of several other important fish species are discarded. Observers were used to estimate catches and bycatch in two estuarine prawn trawl fisheries (Clarence River and Botany Bay) and by oceanic prawn trawlers. Over the three year period, the program was able to establish a rapport with fishermen, and capitalized on this relationship to work with industry on voluntary gear modifications. Fishermen devel-

Fisheries and Oceans Canada / Pêches et Océans Canada



Mesh size	Crabs measured	Mean size	Std. Dev	Std. Err.
65 mm	360	105.3	15.1	.794
70 mm	360	107.1	13.7	.722
75 mm	360	109.1	12.0	.635
80+ mm	360	112.6	12.8	.663

Figure 10. Mesh Sizes Related to Mean Catch Size.

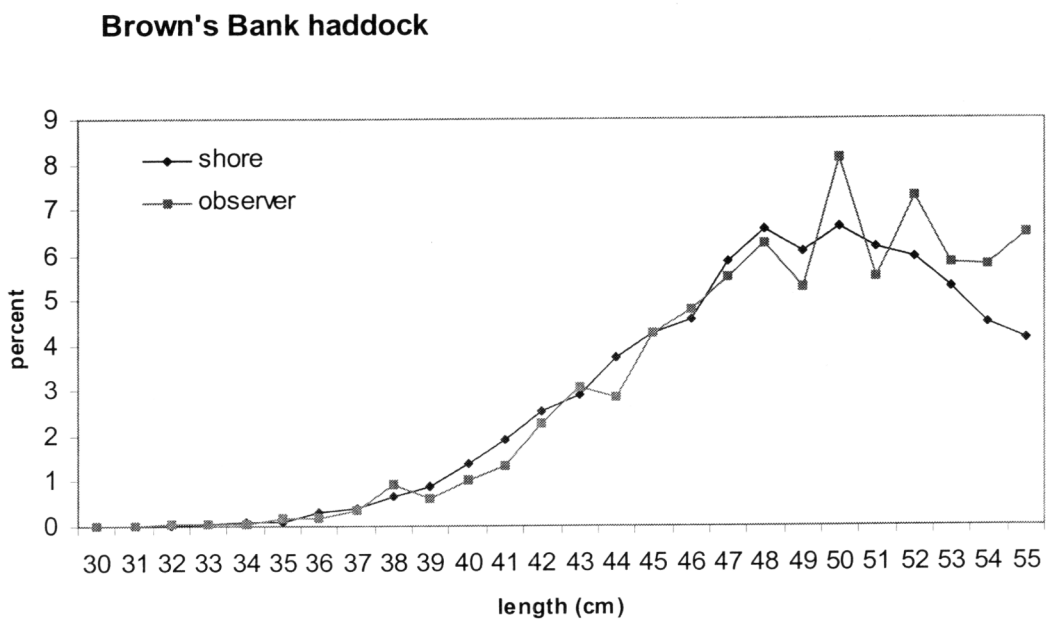
oped their own designs that were later incorporated into regulations. New environmental impact studies and fisheries management strategies are expected to require ongoing observer programs to monitor bycatch, and several new large-scale observer programs are planned to start next year. Kennelly extended an invitation from New South Wales Fisheries to host the Fourth International Observer Conference during 2004 in Sidney, Australia.

Application of Archimedes' Lever to Observer Data

Mark Showell, Canada Department of Fisheries and Oceans, Dartmouth, Nova Scotia, Canada

Information collected by at-sea observers provides valuable data on fishing practices that may not be apparent from dockside observations. For important issues, such as discarding on the basis of size or species composition, observer data are likely the only reliable source available. Unfortunately, using observers is generally an expensive way to collect data compared to shore-based approaches, and coverage levels are often low. In many cases, resource managers are reluctant to factor observer information into decisions on closing fisheries due to a lack of data and concern over potential biases.

Databases in an organization are often like islands, developed independently from each other by different groups. The value of observer data can be enhanced by comparisons to data from other sources (e.g., vessel logs, dockside weigh-outs, shore-based length sampling, hail-out/hail-in data, surveillance). Database technology allows for the integration of these multiple data sources. Differences between data sources provide a more powerful tool for inferring fleet behavior than any data source by itself. To evaluate potential deployment biases (i.e., whether the distribution of vessels with observers is the same as those unobserved), observed fishing locations could be compared to logbook records. To detect whether the reporting or discard behavior of fishermen is altered by the presence of an observer, managers could compare the species composition of observed vessels to that in unobserved landings onshore, or compare length frequencies obtained by observers with those obtained by shore-based samplers. To



- No evidence of discarding below legal size (42 cm)
- indices available to quantify differences

Figure 11. Length Frequency Comparison of Shore and Observer Samples of Brown's Bank Haddock.

determine whether fishermen are accurately hailing out, the hailing database could be compared to the sighting database (Figure 11). The data must be available in near real time to be effective for in-season management, and managers must have access to the data retrieval and analysis tools they need. An automated web-based "tool kit" could allow rapid access and assist routine monitoring.

Role of Observer Data in West Coast Fisheries Management Decisions

Vanessa Tuttle, NOAA Fisheries, Northwest Fisheries Science Center, Seattle, Washington, U.S.A.

The At-sea Whiting Observer Section is somewhat unique in that observer data are the sole source of information used to regulate the fishery in real time. The relatively small fleet of at-sea vessels (9 in 2002) consists of large motherships and catcher processors that harvest a single species (hake) using a single gear type during a single season. Sampling conditions are ideal (flow scales, motion-compensated platform scales, dedicated sampling stations). Observer data are collected and entered at sea and are sent daily via modem to the Northwest Region where they are not blended with any other sources. This process requires quality data collection by highly competent, experienced observers who are able to accurately estimate total catch and sample close to 100% of all at-sea whiting hauls. The amount of quality data and the timeliness of availability make it possible to successfully manage the fishery in this way.

These conditions do not apply in the West Coast Groundfish Observer Program, which is designed to sub-sample the remainder of the coast-wide groundfish fleet to obtain an estimate of total catch and discard. Many different fisheries with different seasons and gear types occurring off the coasts of Washington, Oregon, and California are observed, and managers use a blend of logbook, fish ticket, and observer data to regulate fisheries. Since the fleet is larger (approximately 350 vessels with limited-entry permits), only partial coverage (approximately 10%) is possible. Vessels are generally smaller, and sampling space is limited. Observer data collected at sea are entered by the observer on land and transmitted via modem to a central database where they are edited and combined with data from other sources. Because the data from this program are not available in near real time, they do not contribute to direct in-season management.

Questions and Panel Discussion

Oliver noted that the topic addressed by this panel held special significance for him as Executive Director of the North Pacific Fishery Management Council. The groundfish program in the North Pacific is the largest in the United States, and its observer program differs from others because its data are used to regulate fisheries, not simply to monitor interactions. The North Pacific Fishery Management Council is considering a fundamental restructuring of its observer delivery model; while at the same time is moving toward management at finer levels of detail.

An Alaskan observer contractor asked how users of observer data keep informed of changes to data collection protocols or frequency. Showell replied that he is responsible for setting those protocols, and that they really do not change that frequently. Ianelli admitted that unless the change is very significant, he generally finds out about such changes only after they have occurred.

A representative of United Nations Food and Agricultural Organization who helps developing countries establish monitoring programs wondered whether panel members shared his interest in the use of ecosystem principles to avoid overfishing and waste, and whether the use of this approach would be expanded. Ianelli noted that his presentation had touched on some of the multi-species concepts that were feasible for observer programs, but felt that other ecosystem concepts were still academic. Kennelly acknowledged that the ecosystem concept is currently popular, but that it is difficult to define and is sometimes illogical. Managers must now quantify it since the concept has been formalized in the laws of a number of countries; observer programs are often the first step toward collecting the necessary data. Showell observed that many managers have been tasked to move beyond single-species management, and that observer data are often the only way to quantify catch that is not landed onshore.

A DFO representative asked panelists to identify the challenges to greater use of observer data for fisheries management in conjunction with other data sets. Bibb noted that the Alaskan CDQ program has decided to use observer data exclusively due to the

pressures on fishermen to misreport in other data sources. A major barrier to this approach is cost; large CDQ vessels can afford this level of observer coverage but smaller vessels likely cannot. A lack of experienced observers can also be a barrier when new programs are added and the demands for coverage increase. Showell noted that the inability to access data in a timely manner can be a barrier in instances where managers are not experienced in the use of databases. Ianelli mentioned a lack of communication between fishermen, data collectors, and end users. DeGrâce cited information systems as a barrier, such as the need to provide information on grid closures on a daily basis.

A Canadian Atlantic observer asked how DFO adjusted guideline harvest levels downward if observer estimates of catch were higher than those indicated by vessel logs. Showell replied that DFO does not adjust quotas in-season, but that managers may adjust harvest estimates upward if later analysis suggests that doing so is appropriate. If differences are detected between hail weight and observer weight, Oliver speculated that observer data would most likely be used if there were sufficient data. Ianelli noted that in Alaska, the "blend" process checks the observer estimate against the landed weight on a regular basis.

A representative of the South African observer program asked how observers were trained to estimate catch, and whether there had been any comparisons between observer estimates and estimates obtained using flow scales. Loefflad replied that CDQ vessels use flow scales to estimate catch, and that one duty of observers on these vessels is to monitor the testing of those scales. Catch estimates made without the benefit of flow scales generally use volumetric estimates. Catch that is measured in pieces (e.g., in hook-and-line fisheries) generally use an extrapolation of catch rate to total hooks fished. Bibb noted that one test comparing flow scales to volumetric measurements in the pollock fishery had resulted in an adjustment to the density factor used in the volumetric estimates. The Alaska program generally accepts the estimates from flow scales and uses them where available; it does not conduct ongoing comparisons of flow scales and volumetric estimates. Bibb also mentioned that preliminary results from an ongoing comparison of vessel production records with observer estimates in the longline fishery for Pacific cod suggested that the observer estimates were generally higher.

An Alaskan observer noted that sampling protocols change when the variability of species composition is high, and wondered whether it would be helpful to users if this is noted in observer databases. Ianelli replied that users are attempting to develop consistent ways to combine information from complex fisheries using observer data. He also said it may be useful to assess sample quality on a haul-by-haul basis, but he is uncertain how to accomplished this.

PANEL SESSION 5

How Should Contractor Performance Be Measured?

Moderator: Don Wadhams, NOAA Western Administrative Support Center, Seattle, Washington, U.S.A.
Jeff Barnhart, Alaska Department of Fish and Game, Kodiak, Alaska, U.S.A.
Bob Maier, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.
Mark Naud, Canada Department of Fisheries and Oceans, Quebec City, Quebec, Canada
Gillian Stoker, NOAA Fisheries, Certified Observer, Seattle, Washington, U.S.A.

Measuring Contractor Performance

Jeff Barnhart, Alaska Department of Fish and Game, Kodiak, Alaska, U.S.A.

State of Alaska onboard shellfish observer program regulations adopted by the Alaska Board of Fisheries govern independent contracting agents and establish a legal framework under which the independent contracting agents operate. A contracting agent's certification can be revoked for substantial regulatory violations. However, few regulations address independent contracting agent performance. If a contractor fails to provide an observer, the Alaska Department of Fish and Game must decide whether to issue a waiver to the vessel, provide a department staff person as the observer, or prevent the vessel from fishing until an observer is available. Furthermore, program policy and personnel availability do not allow the Alaska Department of Fish and Game to evaluate the contracting agent's performance with respect to existing regulations.

Unlike other regions of the United States, the fishing industry in Alaska (with few exceptions) pays for observer coverage in the state of Alaska-managed shellfish fisheries. Vessel owners secure contracts for observer services directly with independent contracting agents. Historically, the Alaska Department of Fish and Game has not entered into contracts for observer services with independent contracting agents. The present system does not include a mechanism by which the state may establish or evaluate performance standards, or provide incentives for contractors to meet performance standards. Establishing a performance standards evaluation may improve the quality of services and the delivery system. Independent contracting agents must assume some degree of accountability for their actions. Under the current system, by default, the responsibility to provide adequate observer services rests with the Alaska Department of Fish and Game.

Measuring Performance of Observer Providers in the North Pacific Groundfish Observer Program—Evolution from Report Cards to Enforcement Actions

Bob Maier, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.

The North Pacific Groundfish Observer Program does not have a direct contractual relationship with its NMFS-certified observer providers. Because of this, what started out more than ten years ago as a performance review of each observer provider, patterned after a contractor performance evaluation from the days of the foreign observer program, has evolved into a regulatory compliance, enforcement-oriented approach. The performance review or "report card" approach was eventually abandoned because it was inherently subjective and observer providers challenged any low grades. They did not attempt to improve areas in which the North Pacific Groundfish Observer Program felt they were under-performing because the North Pacific Groundfish Observer Program was not their client. Thus, the performance review had no "teeth."

The annual performance review was replaced with a system whereby observer provider performance expectations are codified in federal regulation, and observer providers are assumed to be in compliance with these regulations unless proven otherwise. Regulatory actions are taken if performance is found to be inadequate. This has led to more clearly defined performance expectations, which are investigated by federal enforcement agents when not realized. Enforcement actions against observer providers have resulted in warnings, notices of violation, and fines. Maier noted that resolution of legal cases can take time (a recent case took two years), so the North Pacific Groundfish Observer Program often tries to work directly with contractors on areas of concern using anonymous feedback provided by observers.

A Simple Way to Evaluate Contractor Performance

Marc Naud, Canada Department of Fisheries and Oceans, Quebec City, Quebec, Canada

In the Quebec Region's DFO, at-sea observer service is provided by a single contractor who has been awarded an exclusive contract. The contractor may only employ observers designated by DFO, and only after their training and certification meet the standards set by DFO. The cost of deploying observers (approximately 70% of total program cost) is borne directly by the fishermen themselves, while the costs of administering the program are incurred by DFO.

Within this context, performance means the contractor's ability to (1) provide high-quality cost-efficient service for fishermen, (2) collect and forward reliable and representative information in a timely fashion, and (3) provide an efficient and representative deployment of observers onboard fishing vessels. To evaluate whether the deployment is efficient and representative, the targeted coverage percentage must be achieved, the ratio of stand-by days to sea days must stay within accepted trends, the deployment of observers must follow patterns of fishing activity, and data quality must be superior. The assessment criteria must take into account factors beyond the contractor's control that may affect the deployment of observers (e.g., geographic isolation, concentration and intensity of fishing, low levels of coverage, fisher's cooperation). Such factors may make it impossible to compare a contractor's performance between different fleets.

Ideas on Evaluating Contractor Performance

Gillian Stoker, NOAA Fisheries, Certified Observer, Seattle, Washington, U.S.A.

To reduce the number of full-time federal employees, observer programs are forced to routinely procure observer services from private companies. The procurement and award of these observer service "contracts" vary widely from program to program in the number of companies providing observers to a single observer program, the responsibilities of the observer service provider, and the ability or willingness of the federal government or observer program to manage observer provider activities. One significant oversight common to all programs is the lack of formal, rigid, and regular performance evaluation of contractors.

A formal structure and objective guidelines for contractor performance evaluation are needed to ensure that NMFS's needs are met, problems are corrected, and good work is recognized. Contractor performance should be based on feedback from the industry, the agency, and the employees (i.e., observers) of the observer service company. Some examples include the following:

- From NMFS' perspective, some objective measures of contractor performance may be the turnover rate, incentives/awards for outstanding observer performance, compliance with contract/certification requirements, outstanding warrants or serious complaints, and past performance as an observer provider in this and other observer programs.
- From the observer's perspective, contractors could be evaluated on how well employees were paid, whether paychecks were deposited on the correct date, the quality of accommodations while in travel status, observer support, and logistical competence (scheduling of airline, vessel, and debriefing).
- For vessels assigned mandatory coverage, performance could be measured by the ability to obtain an observer when reasonable advance notice is provided.

Questions and Panel Discussion

Wadhams noted that as a government contracting officer, he evaluates contractors for a living. He recognized that government, the fishing industry, contractors, and observers all have perspectives on contractor evaluation. From the perspective of a government officer, however, he looks at program objectives and performance measures, sets performance standards, and makes certain that contractors are aware of those standards and the consequences for failing to meet them. In his view, bad behavior by a contractor does not necessarily equate to bad performance. Performance measures should be quantifiable based on their impacts on the program.

A Canadian Pacific observer contractor endorsed clearly defined evaluation targets, and suggested that annual contractor evaluations are not unreasonable. He described the data delivery model in the Canadian system, where the contractor is responsible for editing and merging sea data with landing data. The coverage percentage could be one factor in the evaluation process, but he felt that financial performance is an issue for the industry to address. He confessed to struggling with the variety of program priorities held by managers, scientists, enforcement officers, and the industry, and with how to help observers identify and focus on the most important priorities. He wondered how this lack of clarity affects performance evaluations. Naud conceded that performance evaluations are always a challenge, but noted that observer protocols and priorities in the Canadian Gulf Region are set at the observer briefing and that the observers are not allowed to change those instructions.

An Alaskan observer suggested that the Alaska Department of Fish and Game consider ideas, such as those presented by Stoker, as it explores options for contractor evaluation. Barnhart agreed to present those suggestions to the agency for consideration.

A European contractor evaluating the European Union's observer program asked Stoker whether the use of multiple contractors in the Alaska program was a good practice. Stoker replied that the experience had been terrible, because competition between contractors had driven down observer salaries and benefits for several years. She speculated that NMFS and the fishing industry would have preferred to avoid the formation of an observer union, but noted that observers felt conditions had deteriorated to such an extent that they had no alternative. Since formation of the union, conditions for observers have slowly improved.

PANEL SESSION 6

How Should Observers Be Selected and Trained?

Moderator: Harry Benson, Seawatch, St. Johns, Newfoundland, Canada
Sheryl Corey, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.
Tracey Mayhew, Association for Professional Observers, Anchorage, Alaska, U.S.A.
Stephen Morse, ALU LIKE Inc., Honolulu, Hawaii, U.S.A.
Margaret A. Toner, NOAA Fisheries, Office of Science and Technology, Silver Spring, Maryland, U.S.A.

A Menu for an Observer Training Course

Sheryl Corey, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.

Observer training can be like a grandiose menu at a gourmet restaurant for a trainer. From a trainer's perspective, and keeping in mind the needs of the patrons (the observer trainees), selections from the menu can complement one another and produce a wonderful experience or can be a hodge-podge of servings that somehow fit together to make a full training session, though a stressful one.

Certain protocols need to be established to set the mood, maintain interest, eliminate irritating distractions, and elicit learning behavior on the part of all the participants. In a training course, this may include a room with good visibility and no barriers between trainer and trainees, where trainees can relocate and spread out and the trainer has room to roam. It may also include establishing attendance and conduct rules at the start.

The beverage remains with a diner throughout the meal; in the training context, the trainer imparts a sense of program history to instill connection and pride, an appreciation of the importance of the data, who uses it, and how. Many appetizers can be used to initiate the meal (begin the learning process), and inspire the appetite (invoke commitment to the tasks ahead). These include stimulating trainees with photos, videos, and inspirational tales of life at sea; encouraging immediate involvement; and motivating by relating tasks to results and to their future. For the entrée—the main focus of the training session—the trainer must consider how long the meal should take and how much time is actually available (the constraints of time available for the training material), who pays and how much can be obtained for that buck (funding for better teaching supplies), how much preparation time needs to be invested, what complementary dishes to make the points succeed as a whole, what tools are needed, and the all-important, how good it tastes (actual content assimilation). Main course choices may range from the grilled cheese of lectures (easy, low investment) to the surf and turf of field practice (realism, applicability). Dessert is the wrap-up, but for the observer trainee it is much more. Here trainees realize they really are going to sea. They begin to mentally prepare for the tasks and lifestyle ahead. They make mental commitments to their chosen profession and its benefits and pitfalls. They anticipate eagerly, yet with trepidation, all that will befall them. It is the trainer's final and best opportunity to make that meal memorable, so that those observers satiated and prepared for their work and sea-going life. It is also a trainer's last face-to-face chance to correct misinformation and wrap up the to-go box (ensure they have applicable knowledge).

Effective Observer Training: Are We Up to the Challenge?

Tracey Mayhew, Association for Professional Observers, Anchorage, Alaska, U.S.A.

Fisheries observers have varied life experiences and educational backgrounds. Some trainees come directly from formal schooling, while others are in

the midst of a career change. During training they are subjected to many hours of intense instruction that range from completing paperwork to identifying species to donning immersion suits. At the same time, they deal with the emotional aspect of facing the unknown.

Training should prepare the observer to meet the needs of the agency and create an environment that is conducive for learning. Trainees pass through a continuum in which they are in turn excited, overwhelmed, stressed, and terrified. Trainers should recognize and address those life issues that become a distraction from learning and strive to meet the needs of trainees. Potential distractions can include personal or family responsibilities, insurance, purchasing gear, financial concerns, contract issues, the need to get a physical, conflicting emotions, and time management. Training programs need to recognize that these issues exist and respect their trainees' need to address them. Programs can provide resources for this purpose, build additional time in training schedules to provide opportunity, and consider group discussions or mentoring to help trainees deal with emotional issues. Programs will find that this produces trainees who are less preoccupied, are more open to learning, are better prepared, make an easier transition into the field, and are more supportive of the program. Trainees will be under less stress, will retain more of what they have been taught, will be healthier and work more safely, and will collect better data from the outset.

Minimum Educational Qualifications for Recruitment of Observer Candidates

Stephen Morse, ALU LIKE Inc., Honolulu, Hawaii, U.S.A.

One of the main standards addressed by the Native Fishery Observer Project was that of educational qualifications for fishery observers. In Hawaii, the federal employment contractor for NMFS was restricted to recruiting, training, and hiring observers with Bachelor of Science degrees. ALU LIKE, Inc., believed this requirement was too stringent and excluded native people, who have generally lacked the educational opportunities and financial means to pursue higher education. After researching the common duties of observers, the firm determined that native individuals who had less than the required educational qualifications could become certified and proficient observers, given adequate support, preparation, and proper training opportunities. Both Hawaiians and Samoans have a strong and proud seafaring background, have similar customs and traditions, and share a strong cultural affinity as Polynesians.

The project established as minimum educational requirements a high school diploma, graduate equivalency diploma, or Veteran DD-214 training documentation. Applicants must also be of indigenous ancestry (native Hawaiian, native American, Pacific Islander), have U.S. or Trust territory citizenship, and be at least 21 years of age. Applicants receive an initial assessment (aptitude and basic skills testing, physical examination, background check, and drug test), and a final academic assessment after completion of the ten day preparation training before they are selected for NMFS certification training.

Preparation training covers fisheries science and oceanography, the metric system, data collection, ocean safety, marine radio use, first aid and CPR, species identification, and tissue sampling procedures, and includes a day aboard the University of Hawaii's longline vessel. The program provides trainees a living allowance during training, hotel accommodations, reimbursement for training materials and supplies, round-trip airfare for non-Oahu residents, a suitable training environment, and a facilitator for mandatory twice-daily study groups. Applicants who complete Preparation Training and qualify for NMFS observer training receive daily contact with instructors for individual or group tutoring, and an 8-month follow-up after becoming certified observers (Figure 12).

Since January 2002, the project has helped train11 native Hawaiians and 5 American Samoans, who have been certified as fishery observers by NMFS. Fourteen of these individuals were minimum-standard qualifiers. According to NMFS debriefers, previous trainees who are now working on longline vessels are providing accurate, high-quality data.

Can the Selection Process Result in Better Observer Performance and Increase Observer Retention?

Margaret A. Toner, NOAA Fisheries, Office of Science and Technology, Silver Spring, Maryland, U.S.A.

Several existing models or selection methods could be used by fisheries observer programs to help improve performance and increase retention. For

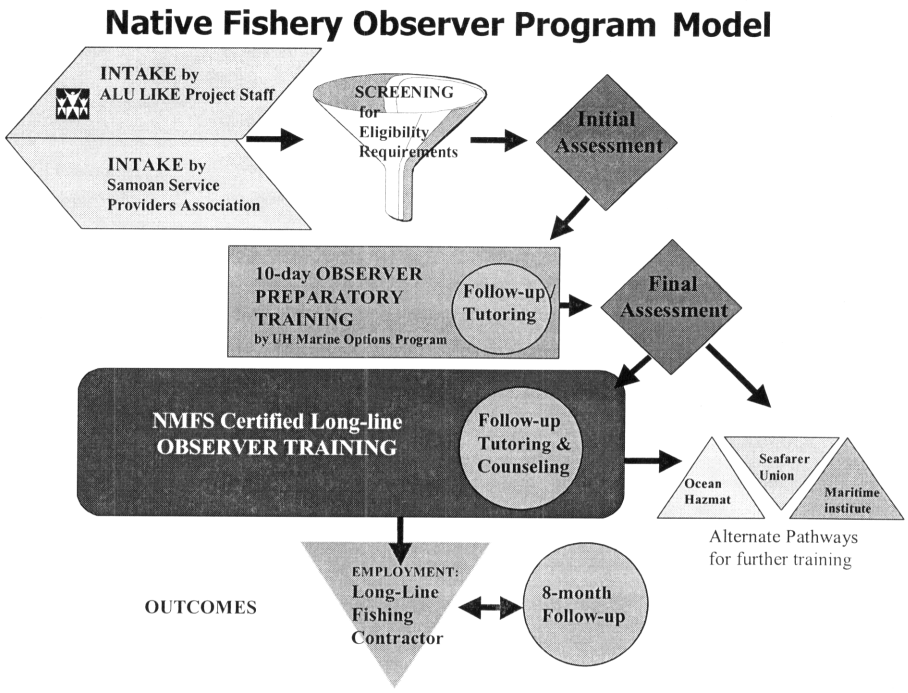


Figure 12. Alu Like Native Fishery Observer Structure.

example, the United States Peace Corps is also in the business of selecting candidates for arduous work in often harsh environments. Like observing, Peace Corps assignments often pose unique physical, mental, and emotional challenges.

The Peace Corps' selection process includes an extensive medical background check and a rigorous interviewing process to determine a candidate's flexibility, adaptability, social sensitivity, cultural awareness, motivation, and commitment to service. Aptitude tests, like those of the Johnson O'Connor Institute, could also be used to select candidates based on their abilities and affinities for certain types of work. The Johnson O'Connor Institute is a nonprofit scientific and educational organization that seeks to study human abilities and provide people with knowledge of their aptitudes to help them make decisions about school and work.

Questions and Panel Discussion

The Hawaii observer contractor currently employs about 35 observers who work 6,000 to 7,000 sea days to provide 20% coverage of longline fisheries. NMFS guidelines require all observers to have a bachelor's degree in biological sciences with credit hours in specified subjects. Those who meet these qualifications are generally able to complete certification training, and after a few trips the data they provide are of good quality. Unfortunately, only a relatively small group of individuals in Hawaii meet those qualifications and want the job, so recruiting is a challenge. These individuals are usually imported to the area, so there are housing and transportation issues, and turnover is high because observing is often a transition job between schooling or other work (only about 50% complete more than one contract).

NMFS amended the contract to allow exceptions to the minimum requirements under certain circumstances, thus enabling the partnership with ALU LIKE. Seven graduates of the program have been hired, and the results to date have been mixed. One recruit was excellent from the beginning, and four of the remaining six are now working well after some individual help. The additional 10-day training in the basics that these individuals receive is extensive, but the passing rate for those taking the training for the first time is low. The program has been repaid for this extra effort by recruiting several good employees and by providing employment opportunity to otherwise disadvantaged Hawaiian natives. However, the hiring of non-degreed observers may open NMFS to legal liability

for dual hiring standards, lower the professional status of all observers, or widen the field of potential candidates sufficiently to put downward pressure on observer wages.

This list of concerns sparked an extended discussion between the panel and the audience. Mayhew suggested that one way observers could keep compensation from deteriorating would be to organize; there are currently no unions representing Hawaii observers. An Alaskan observer applauded the outreach effort, citing it as an example of creative thinking. Another Alaskan observer and Association of Professional Observers representative considered it an interesting opportunity to test the effects of observer retention on data quality (i.e., whether better data are provided over the long term by non-degreed observers who stay with the program, or by observers with degrees who move on to other jobs after a short time).

A Southwest Region representative suggested that anyone who can pass training should be allowed to be an observer, but also admitted that the dual standards could pose a problem for the Department of Labor wage rate determination. A U.S. Atlantic observer wondered whether the increased training costs could be justified as an acceptable return on investment if retention of these individuals is higher; representatives of the Hawaii program replied that it is still too soon to determine whether there will be increased retention. A representative of the West Coast observer program supported the degree standard on the basis of the reduced training these applicants require; he cited the development of a professional image for observers, the lack of any minimum standard other than a degree, and the limitations of current training funds. Mayhew agreed that all trainees need a base of knowledge, and suggested that distance learning could be used for some topics (e.g., fish identification) or that a national/regional "Observing 101" class could provide basic training for a variety of programs.

A representative of the Alaska observer program noted that birds imprint at hatching and wondered if similar logic would make NMFS trainers better than contractor trainers. Corey replied that maintaining consistency is of utmost importance, but that variety in trainers may be desirable because some students may not be able to relate to an individual trainer.

PANEL SESSION 7

What Is Meant by Observer Support, and Why Is It Important?

Moderator: Kim Dietrich, Association for Professional Observers, Seattle, Washington, U.S.A
Reuben Beazley, Seawatch, St. Johns, Newfoundland, Canada
Joe Chaszar, University of Alaska, Observer Training Center, Anchorage, Alaska, U.S.A.
Vicki Cornish, NOAA Fisheries, Office of Science and Technology, Silver Spring, Maryland, U.S.A.
Dennis Hansford, NOAA Fisheries, Office of Science and Technology, Silver Spring, Maryland, U.S.A.
Peter Risse, University of Alaska, Observer Training Center, Anchorage, Alaska, U.S.A.
Suzanne Romain, Association for Professional Observers, Seattle, Washington, U.S.A.

What Is the Role of the Observer in Violation Situations?

Reuben Beazley, Seawatch, St. Johns, Newfoundland, Canada

To be effectively supported in a compliance role, some fundamental issues must be addressed from the observer's point of view. These include:

- A safe workplace.
- A clear understanding of the observers role and the regulations with which they have to work.
- No confusion between the captain and the observer on what is to be accomplished.
- Access to updated regulations, including continuous and direct communication with the government agency. Rules can change from trip to trip, or even during a single deployment, and the observer must have backup in the case of conflict.
- Prompt and clear attention to observer violation reports, with a mechanism in place to promptly inform the observer of what action has been taken.
- A list of priorities for observers who find themselves in a multiple violation situation. It may not be possible to thoroughly investigate all of them, and there may be a loss of other sampling and species identification work.
- Assurance that the integrity of the program is not compromised in cases where observer coverage is industry-funded. The integrity of the observer program must not be undermined in the name of cost by having higher paid, experienced observers replaced with lower paid, inexperienced staff, or simply by having wages cut across the board so that the standard of living cannot attract or keep good candidates. The fishery must be protected above all else, and any fishery that cannot afford its own conservation is ecologically and economically untenable.
- A learning curve. It takes 3–5 years for an observer to become comfortable with the job. Usually it is a matter of learning from mistakes. It is often only after a trip, during the debriefing process, or when talking to older hands that inexperienced observers realize they have been deceived. There is a need to attract quality people and keep experienced observers within the system to avoid making the same mistakes over and over.
- Recognition that debriefing is just as important as sea time. Debriefing is where the observers learn their trade. Without questions and input from an experienced debriefer, the learning process is much longer. A representative of the government agency should be directly within the debriefing structure.

- Observers in a compliance role are in the front line of conservation. They must remember that they are not the crew and must maintain distance from the crew. This can lead to stress. The pressure to do the job is especially problematic in long-term violation situations.
- A support system. The observer is foremost a sailor and is not immune from all of the normal conditions and dangers of the sea. There must be a support group for the observer and professional counseling if necessary, particularly in the case of shipwreck and/or loss of life.

Professional Communication and Conflict Resolution Training for Observers

Joe Chaszar, University of Alaska, Observer Training Center, Anchorage, Alaska, U.S.A.

Fishery observers face many challenges that can affect the quality of their sampling efforts, including tight living quarters, a different social environment, dangerous working conditions and less than ideal sampling situations. Compliance and quota monitoring pay put them at odds with the crew. These challenges are often related to a lack of cooperation or understanding of the observer's role. Many potential conflicts and impediments to sampling that occur can be resolved by maintaining professional communication at all times.

The North Pacific Groundfish Observer Program began implementing conflict resolution training in 1998, and experienced communication trainers were contracted to provide the instruction. Since its initial offering, the unit has evolved into "Professional Communication and Conflict Resolution," and is now delivered by the training staff at the North Pacific Groundfish Observer Program and the North Pacific Fisheries Observer Training Center. Trainees are taught the elements of effective communication (nonverbal communications, presenting yourself, recognizing differing perspectives and motives, active and respectful listening, effective talking, and maintaining a positive attitude). Following completion of this instructional unit, the trainees are able to state why professional communication is a critical part of their job, why there is potential for conflict at sea, and what professional communication and conflict resolution tools can be employed. Trainees learn to recognize similarities and differences between the goals and perspectives of fishermen and observers, and that individual communication styles vary. Finally, each trainee participates in role plays illustrating these concepts.

As this program progresses, the North Pacific Fisheries Observer Training Center would like to obtain more input and participation from the fishing industry concerning communication-related issues. The North Pacific Fisheries Observer Training Center is also in the process of producing professional videos demonstrating potential conflict scenarios and how address them.

Decent Wages for a Hard Day's Work

Vicki Cornish, NOAA Fisheries, Office of Science and Technology, Silver Spring, Maryland, U.S.A.

The U.S. Service Contract Act applies to all work performed for the U.S. government on land and within U.S. territorial waters. It establishes minimum wage requirements for service (non-professional) workers, and requires overtime pay for work in excess of 40 hours per week. Contracting agencies notify the Department of Labor when awarding new contracts, and Department of Labor issues wage rate determinations for all service contracts based on the classified job descriptions of service employees who will perform work for the awarding agency. The NOAA Fisheries has several contracts that require the services of fisheries observers; however, Department of Labor lacks a clearly defined and uniform description of the duties and responsibilities of these observers. NOAA Fisheries has provided Department of Labor with equivalent federal wage rates for similar positions, which are usually based on a GS 5, Step 1, Biological Technician. However, even with this information, Department of Labor has rendered wage determinations that have varied considerably between regions and are sometimes lower than the equivalent federal wage rate.

In 2001, the National Observer Program began formulating clear and concise descriptions of observers' duties and responsibilities that would incorporate all regional observer programs subject to the Service Contract Act. Three grades of fisheries observers were described. These were approved within NOAA and forwarded to Department of Labor for review in the summer of 2002. Incorporation of these position descriptions into Department of Labor's catalog of job categories will help ensure that subsequent wage rate determinations for fisheries observers will

be rendered from a uniform national standard, and at a wage rate that is competitive for attracting and retaining high-quality observers.

Compensating Injured Observers

Dennis Hansford, NOAA Fisheries, Office of Science and Technology, Silver Spring, Maryland, U.S.A.

Observers who are injured should receive direct compensation, consistent coverage regardless of duty station, and sufficient compensation so that their quality of life is not severely reduced. Injured observers can currently seek restitution under state Workers Compensation programs, U.S. Longshore and Harbor Workers Compensation, the Merchant Marine Act (the Jones Act), general maritime law, or the Federal Employee's Compensation Act. Observers who attempt any of these remedies face unique challenges. The National Observer Program has been working with a contractor to review insurance issues and to craft a remedy for current inadequacies. Draft legislative language (the Fisheries Observer Compensation Act) has been developed that would provide: (1) first-party compensation coverage to observers in the event of injury or death; (2) one-stop coverage for land- and sea-based duty stations; (3) protection while en route to and from all assigned duty stations; (4) judicial recourse; (5) reassurance to observer providers and vessel owners that liability for negligence will be held to a minimum; and (6) cost benefits to the federal government by reducing redundant insurance coverage. Support and passage of this legislation are expected to have positive recruiting and retention implications.

Sexual Harassment and Assault Prevention Training for Observers

Peter Risse, University of Alaska, Observer Training Center, Anchorage, Alaska, U.S.A.

According to the American Medical Association, as many as 650,000 women are sexually assaulted every year in the U.S. National statistics also indicate that at least 20% of all women will be the victims of some sort of sexual assault during their lifetime. It is estimated that less than 50% and as few as 10% of sexual assaults are reported. Victims fail to report assaults because they lack trust in the system, suffer self-blame or embarrassment, or do not know to whom or how they should report. How observer program staff respond can affect recovery. Victims need access to professional support agencies, and long-term psychological or job performance effects can be expected.

In 2000, recognizing that the observer community most likely falls in line with national statistics, the North Pacific Groundfish Observer Program selected Standing Together Against Rape of Anchorage, Alaska, to provide response and prevention training to all trainers, staff, and observer providers. The goal of this initial training was to ensure that everyone who has regular contact with observers is aware of the steps to take if notified of sexual harassment or an actual assault. Access to Standing Together Against Rape was made available to all observers via Standing Together Against Rape's 24-hour hotline.

All observer programs should recognize that sexual harassment and assault can and most likely will occur. Programs should (1) provide training for everyone working directly with observers and their managers, (2) provide additional specialized training to field staff, (3) provide periodic updates for field staff, (4) develop support agency contacts and information for observers, and (5) establish written protocols and ensure that staff are aware and trained in prevention, victim support, staff response, and enforcement considerations.

Can There Be National Coordination and Consistency for Observer Support?

Suzanne Romain, Association for Professional Observers, Seattle, Washington, U.S.A.

Traditional employees look to a single source for management control and employer support, but observers must rely on multiple sources. The fishing industry is responsible for providing an adequate work environment; NMFS provides training, evaluations, and equipment; and the observer provider supplies a position, compensation, and insurance. This convoluted employment status, combined with atypical working conditions, requires support standards specific to observers. Observing is not merely a technical position. Multidisciplinary training and certification standards are needed to deal with such issues as the conflicts inherent in observer compliance monitoring. The scope of entities and individuals who are affected by how well observers do their job (i.e., data users) are also extreme, so data users need to define their needs, associated training parameters, and a common language.

All of these factors suggest the need for a national entity to set training and support standards that ensure data quality, promote efficient data utilization, and address overlapping and divided employer responsibilities. Several organizations are moving in this direction. Professional associations, such as the Association for Professional Observers and educational and environmental groups, have provided outreach, research, and education support. The National Observer Program has given database, financial, and legislative support. Unions and labor groups monitor labor standards.

The need for national support standards is critical. Suitable compensation promotes retention, and retention of experienced observers promotes high-quality data collection. Standards for observer workplace safety promote an accurate representation of fishing vessel safety. Standards for training and evaluation are essential in the development of a common language among observers, observer programs, observer providers, and supporting agencies, which will lead to efficient data exchange on a national level.

Questions and Panel Discussion

A U.S. Gulf Coast observer provider asked how the standard observer job descriptions and pay grades could adequately compensate experienced observers to retain them for the long haul. Cornish replied that the standards were geared toward contractors and merely set the minimum wages for observers. Within their own contracts and budgets, contractors are free to increase these levels to whatever extent necessary to promote retention. While wages are important, benefits (e.g., insurance, medical plan) are also valuable to those who plan to remain involved for the long haul. Contract employees may be more willing to stay if benefits were provided. Incentive-based statements of work (e.g., built-in step increases) may be used to offset a lack of benefits. An Alaska observer endorsed the need for provision of benefits like 401(k) plans, stating that at times she feels irresponsible continuing as an observer because she is not planning for the future.

A U.S. Atlantic observer pointed out that observing is one of the few jobs in which people who work contentiously are increasingly likely to lose their job (e.g., a fishery will close if bycatch limits are exceeded). He asked whether the work could be structured to guarantee a fixed period of employment and thus avoid this paradox. Romain stated that the conflict could be avoided if observers were paid adequate wages, noting that her personal plans focused around working a particular number of contracts, rather than a 12-month period. An Australian observer noted that observers there are hired for the normal term of the fishery, and that payment for a fixed period could remove the temptation to weigh economics against ethics. Beazley observed that integrity is the ability to do the right thing when nobody is looking. A Canadian observer suggested that observers who provide information that closes a fishery should be given a bonus because they are preserving the livelihoods of many others.

An Alaska safety consultant asked whether there is general agreement on who constituted the observers' employer. Hansford replied that there is no agreement on the national level; there are several service delivery models, and within each of those models the employer status is clearer. Romain believes that there is confusion, even within those delivery models. Cornish noted that observers clearly are not hired by NMFS, but that NMFS does recognize the need for observer support, and is walking a fine legal line to determine the level of support the agency can provide. An Alaska observer asked whether support from the contractor is clearly defined from DFO support in the Canadian system. Beazley replied that Canadian observers work for their contractors and not for DFO. Contract rebidding and renewal in Canada is a major issue because observers can never be certain that their contractor will be retained.

A fishery management council member considered it ironic that NMFS has decided against hiring observers directly as a cost-saving measure, but that observers who now work for contractors are seeking to increase wages and, thus, costs. He wondered whether NMFS has chosen the wrong path. Cornish noted that privatization has been a recent theme in government that the agency has not chosen to fight. There are benefits and disadvantages to both approaches, and there may have been an interest in transferring some liability outside the agency. She viewed establishment of the North Pacific observer cadre as a positive development that should be expanded if not for the shortage of

available positions within the agency. A Canadian observer asked whether any studies actually show government cost savings through the use of observer contractors. Cornish was aware of one study that suggested the costs for going outside the agency were actually higher, but said most studies have looked at the management implications of contracting, rather than the budgetary impacts. An Alaska Department of Fish and Game representative noted that the state of Alaska uses both contract- and state-employed observers, and has weighed the options of both approaches; overhead costs are generally less for state employees. The Alaska Department of Fish and Game has not noticed that the industry treats these two classes of employees differently.

An Alaska observer asked how many of the Alaska observer providers participated in harassment training. Risse replied that four of the five providers had participated, and that the fifth was unable to attend because of a scheduling conflict. He suggested that such training could be made mandatory, but a representative of the North Pacific program noted that a regulatory requirement is unnecessary if participation is already high. A representative of Association of Professional Observers commended the North Pacific Observer Training Center for its proactive approach to harassment issues, and encouraged the organization to promote its other similar activities more aggressively. She also encouraged managers not to overlook the small, unexpected commendations for good work or perquisites that employers can provide; these can boost employee morale immensely.

PANEL SESSION 8

Lessons Learned: What Guidance Can Be Provided to New Observer Programs?

Moderator: Shawn Stebbins, Archipelago Marine Research, Victoria, British Columbia, Canada
Steven J. Barbeaux, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.
Richard Caslake, Sea Fish Industry Authority, Andrews Dock, U.K.
Grant Course, Centre for Environmental Fisheries and Aquaculture Science, Suffolk, U.K.
Jonathan Cusick, NOAA Fisheries, Northwest Fisheries Science Center, Seattle, Washington, U.S.A.
Gary L. Graham, Gulf and South Atlantic Fisheries Foundation, West Columbia, Texas, U.S.A.
Charles A. Gray, New South Wales Fisheries, Cronulla, New South Wales, Australia
Martin Loefflad, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.
Nan Garret Logan, NOAA Fisheries, Northeast Fisheries Science Center, Woods Hole, Massachusetts, U.S.A.
Bob Mikol, OceanLogic, Juneau, Alaska, U.S.A.
Alexia Morgan, Florida Museum of Natural History, Gainesville, Florida, U.S.A.
Amy Sierra Van Atten, NOAA Fisheries Northeast Fisheries Science Center, Woods Hole, Massachusetts, U.S.A.

Introducing Organizational Control Analysis Methods for Observer Program Evaluations

Steven J. Barbeaux, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.

Organizational Control Analysis is an approach designed to assess whether the organizational control techniques adopted by a program provide reasonable assurance that control objectives will be met and risks will be mitigated. Assessable units in an analysis of an observer program would include the service delivery model, event cycles, processes, and organizational controls. A management risk is a negative event or situation that may occur if all or part of an event cycle is not appropriately carried out. A control objective is the opposite of a risk; it is a positive event that should occur if control techniques are adequate. Reasonable assurance is the standard by which organizational controls provide reasonable, but not absolute, assurance that the control objectives will be accomplished. This standard recognizes that the cost of control techniques should not exceed the benefits derived.

Eight different program event cycles were identified in an analysis of alternative observer service delivery models worldwide: program planning, funding, data collection protocols, recruitment, training, logistics, data quality control, and data storage and dissemination. Under these event cycle headings, 24 separate risks were identified. For each of these risks, the analysis attempted to identify the source of the risk, the control objectives (i.e., the desired outcome), and the assessment criteria that will be used to assess this risk, and provided specific examples of control techniques. Organizational Control Analysis is meant only as a starting point to identify the controls needed in an observer program to ensure adequate data collection.

Can Fisher Self-Sampling Be Used to Monitor Discarded Catches?

Richard Caslake, Sea Fish Industry Authority, Andrews Dock, U.K.

Discard data in the U.K. has traditionally been collected by trained observers deployed onboard commercial vessels. The feasibility of sampling U.K.

otter and beam trawl fisheries in ICES Subarea VII was examined using Fisher self-sampling (FSS). A single shore-based officer could coordinate a FSS program, enabling the sampling of a larger number of vessels over a wider area for a given time period than a ship-board observer. Other anticipated benefits included risk and cost reductions and the ability to sample vessels that would otherwise be excluded from routine monitoring. Participating vessels were given a self-sampling kit and were instructed to collect ten samples per trip, for which they were paid 5 pounds per sample. Samples were analyzed onshore by a fishery officer. Integrity was ensured by comparing the vessels' results with those obtained by trained observers working within the same fisheries. Fishers received no payment if their samples were thought to be untrue.

The study showed that it was possible for fishers to collect discard samples on commercial vessels. Extrapolating factors used to estimate retained and discarded fish in the total haul tended to be higher for the FSS samples than for those collected by observers. Observers were instructed to increase sample size if the catch was large, while fishers were commissioned to take a pre-set sample size. Requiring fishers to increase sample size when appropriate could improve confidence levels for FSS. Researchers are currently investigating at-sea weighing of both discarded and retained catches.

Coordinating an International Catch Sampling Survey in the North Sea

Grant Course, Centre for Environmental Fisheries and Aquaculture Science, Suffolk, U.K.

A recent international effort aimed to sample catches from commercial vessels of all coastal countries in the North Sea and Skagerrak and to combine all nationally raised data to obtain an estimate of total fish retained and discarded by gear type for the entire area. A sampling coordinator was given the task of collating the data. Submission formats were accepted by all partners, and the coordinator designed and circulated data submission sheets. Database designs and age-length keys were shared. Observers sampled 9,062 and 1,583 fishing hours on the North Sea and Skagerrak fleets, respectively. All submitted data were combined, and the main commercial species were estimated. Other international collaboration included dual national sampling trips and international training courses (i.e., a safety training and a sampling workshop for observers), which were determined to be successes by participating countries.

Sampling problems were identified during the project and were discussed at project meetings. No single international catch sampling technique could be employed, and vessel selection procedures were not uniform. Sharing age-length keys removed the international independence of data sets. Data submission was often late, and some countries did not collect the agreed data. In European waters, especially in the North Sea, vessels often land at foreign ports and are, therefore, difficult to sample. National politics and priorities also interfered with sampling protocols and project targets. Issues also arose concerning which country should sample vessels registered to one national fleet but owned and crewed by another country ("flag of convenience" vessels). Management measures affected the study (e.g., Norway's North Sea quota cuts led to virtually no fishing). Since vessel access was voluntary, increased management measures reduced fisher cooperation. Some nations also had problems obtaining permission to sample their fleet or could not get permission from the fishing industry to publish data. Not all of these problems could be overcome.

Raising the sampled data to the national fleet and international fleet levels also proved challenging. The accuracy of national fleet effort and landings reports varied widely. Low sampling effort on some segments of the fleet meant that one country harvesting very few fish could represent all others in that category. Extrapolating factors were sometimes large (e.g., a factor of 388 for all gears and countries in the North Sea).

Any countries likely to be participating in future international research projects were offered a few words of advice:

- Have all agreements documented and specific, and make all countries fully aware of the consequences of not meeting contractual obligations.
- Ensure that all countries are able to produce what they promise, and have full industry support to use the data if appropriate.
- Undertake as much international collaboration as possible, but do not allow any deviation from exact data submission formats.

A New Program: The West Coast Groundfish Observer Program Perspective

Presented by: Jonathan Cusick, NOAA Fisheries, Northwest Fisheries Science Center, Seattle, Washington, U.S.A.

Starting an observer program takes planning, communication, and dedication of the staff involved. While many factors must be addressed, two of the most important involve goals and communications.

Observer program goals have three interrelated components:

- Focuse and clearly define the goals. These are the sole purpose for the existence of a program and the mandate behind its funding. Staff should remind themselves of these goals frequently. In the case of the West Coast Groundfish Program, the goal is to estimate discard and total catch. This makes the program an essential and comprehensive piece of the bycatch puzzle on the West Coast.
- Determine whether the goals can be attained safely with available observer resources. If the amount of data that can be collected with limited resources is insufficient to make the needed decisions, the goals need to be redefined.
- Determine whether the goal will ever be completed. A program may be over once it develops an interaction or harvest estimate, or it may collect ongoing information for fishery management. A clearly defined goal helps to determine when or if a program is successfully completed.

Effective communication is essential to any successful program. New programs will affect the fishing industry and many other agencies (e.g., regional offices, science centers, U.S. Coast Guard), which need to know about your observer program. Effective communication fosters better understanding within the fishing industry and keeps observer programs apprised of vessel activity and fishing trends.

Considerations Regarding the Establishment of Observer Programs

Gary L. Graham, Gulf and South Atlantic Fisheries Foundation, West Columbia, Texas, U.S.A.

The Gulf & South Atlantic Fisheries Foundation, Inc., has been involved in cooperative observer programs for over a decade. Although the Gulf & South Atlantic Fisheries Foundation, Inc., has been a very successful endeavor, it has learned certain lessons that have helped refine its programs. While nuances exist in all fisheries and the following points are associated with the shrimp industry, they should have application in many U.S. fisheries:

- Industry collaboration and project ownership are important. Have reasonable expectations; not everyone will help, but with patience, they may come around in time.
- Teamwork is the key. Successful observers integrate with the crew by assisting with certain vessel tasks—galley chores, cleaning, etc. Help given is often returned.
- Cooperators must be protected from liability issues.
- Although fleet owners must be accessed, do not forget to establish communication and understanding with the crew prior to deployment.
- Trip debriefing with the vessel owner and the captain/crew, and communication with them later in the project are assets.
- Not everyone can communicate with commercial fishermen. Use a contact person who can.
- Cooperators must understand elements of scientific protocol. During efforts involving comparative tows, they must be prepared that some tows will not be used in the database.
- Good observers are vital, and experience is invaluable. Methods for retention and reward need consideration.

Observer Surveys of a Different Scale: Experiences, Lessons Learned, and Future Considerations in Small-Scale Fisheries

Charles A. Gray, New South Wales Fisheries, Cronulla, New South Wales, Australia

Observer-based surveys of the retained and discarded catches of several small-scale estuarine fisheries in New South Wales, Australia, have been completed. These studies of the prawn seine and multispecies beach seine and gillnet fisheries were instigated following concerns from other resource interest groups over discarding and bycatch problems in these fisheries. Although researchers encountered experimental design and data concerns similar to most studies typically done at sea, many unique logistical problems and constraints needed to be overcome. These were primarily related to working on very small (< 6 m) vessels in highly dynamic regional fisheries subject to much external pressure to change. There was no compliance aspect to these programs and industry participation was voluntary, but future studies may be made mandatory.

The use of small boats presented serious space issues, gave fishers a ready excuse for not taking an observer, and created problems obtaining a representative sampling of the smallest components of the fleet. Observers could take only a minimum amount of gear, which affected the sampling that could be conducted. An independent research vessel followed fishing vessels to fishing sites at added cost. Bycatch species in beach seine fisheries are normally allowed to swim off after they are removed from the net, so observers were required to stand in the water with fishers and sort bycatch into floating pens for later sampling. Costs were high because so much gear and two samplers were needed. Safety issues (e.g., sharks) were also associated with this type of work.

Other logistic issues surrounded the nature of the fisheries and the fishers themselves. The hundreds of owner-operators are scattered across 1,500 km of coastline and estuaries using multiple access points and multiple fishing methods. These factors made communication and organization difficult. Flexible sampling arrangements were necessary, which affected the time and cost necessary for these studies.

Effective communication is important, but is also time consuming and difficult. The program spent considerable time dispelling fears, selling the positives and acknowledging the negatives. Lessons learned: start early and be consistent and open. To involve industry in this work, good communication is essential.

The observer became the focal point for much of this communication. Observers received no formal training—simply a review of the sampling protocol and an initial supervised trip. The program tried both locally hired samplers and others who were centrally based. It became apparent that these individuals were not just samplers but were also organizers and communicators. They had to develop a personal rapport with fishers and became the face of the program.

Attempting to Extract Wisdom from Good and Bad Experience

Martin Loefflad, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.

The essential elements are applicable to any new observer program. These include:

1. Plan ahead, if you can. Recognize that sometimes agencies are pressured to do things quickly.
2. In planning, identify what you are trying to do, and the milestones that will tell you when you are there.
3. Use the many resources available around the country and around the world.
4. Get good people, train them well, and take care of them. All programs are competitors for good people.
5. Good people will help get good industry cooperation, which will make everyone's life easier.
6. Don't tolerate harassment or sample interference. Both are unacceptable and damaging to people and data.
7. Get internal and interagency support for your program (enforcement, general counsel, Coast Guard).
8. Do whatever you can to keep observers safe at sea.
9. If possible, fund the program with a source independent of the fishing industry.

10. If industry funds are used, recognize industry will want to have a say in how the funds are spent.
11. Plan to adapt to change as the agency needs change. (See point #2: new milestones may affect old milestones and objectives).
12. Do your work as if you will need to defend it in court—because you probably will.

Protect the Data Resource Using Database Features

Nan Garrett Logan, NOAA Fisheries, Northeast Fisheries Science Center, Woods Hole, Massachusetts, U.S.A.

Observer program staff need to "Love Your Data." For credibility and accuracy in analysis, observers' data collection efforts must not be compromised by entry errors and incomplete verification when data from paper log sheets are translated to digital form and incorporated into existing master data. The Northeast Center uses a combination of techniques to safeguard the integrity of data collected by observers. At data entry and initial audit, the data are checked by a proprietary data entry program. The program avoids "hard-wiring" data checks by using a number of code look-up tables and a general auditing table to check codes and ranges of data. In this way, range changes or additional code introductions are accommodated with a simple update to the data in the look-up tables, rather than by rolling out a new version of the program. When processing data into the Oracle database system, a number of Oracle features are used: table constraints require designated fields to be populated, data must fall within rigorous ranges, key values must be unique for a table, and data in associated tables must be consistent. "Triggers" are used to enforce relationships, such as the beginning and ending dates and times of a trip, and times and dates of hauls relative to the trip date and time. The look-up tables used in the data entry program are duplicated in Oracle and continue to serve a verification role. Such features have been critical in building confidence in the observer data.

Promoting Your Regional Observer Program through Data Products

Bob Mikol, OceanLogic, Juneau, Alaska, U.S.A.

As observer programs continue to develop and expand, it is important to remember that the fisherman is more than a data collector's "platform of opportunity." Ultimately, the fisherman is the client. After all, what would be the purpose of a fisheries management agency if there were no fishermen? Fishermen have long complained about collecting data for their governments and getting nothing in return—or even worse, having the data shut down their fishery.

Data collection agencies have a responsibility to share data—not as raw data, but as information—with the harvester and the greater fishing community. Taking this approach will foster industry support and acceptance of observer programs and will encourage a higher degree of vessel cooperation and possibly higher-quality data. Just as data are valuable to government agencies as a management tool, they are also valuable to fishers as a business asset.

Using simple software tools, spreadsheets, and geographical information systems, agencies can deliver high-quality and valuable data products to fishermen and their communities on a timely and regular basis. When data products would naturally vary from one fishery and region to another, they might include: weekly catch statistics; bycatch hot spots reports, including charts; and seasonal atlases and summaries. Agencies can make the information that the data create valuable to fishermen, make it timely, and make it interesting.

The Commercial Shark Fishery Observer Program

Alexia Morgan, Florida Museum of Natural History, Gainesville, Florida, U.S.A.

The Commercial Shark Fishery Observer Program, University of Florida, places observers on bottom longline vessels of the U.S. Atlantic shark fishery. Historically funded by two U.S. Department of Commerce funding programs—Marine Fisheries Initiative and Saltonstall-Kennedy—and by the Highly Migratory Species division of the National Marine Fisheries Service, Commercial Shark Fishery Observer Program observers have recorded the composition and disposition of the catch and

bycatch in this widespread fishery (New Jersey to Texas) since 1994. Since the shark catch is headed, gutted, and finned at sea, port sampling is not a viable means of quantifying the catch because the marketed carcasses are difficult—if not impossible—to identify to species. In addition, bycatch in the fishery is discarded at sea or used as bait and, thus, cannot be quantified at the dock.

Programmatic data gathered by an unbiased team of academic observers serves as a common starting point for management discussions during the regulatory process. The Commercial Shark Fishery Observer Program, originally developed as a cooperative program among the University of Florida and the Gulf and South Atlantic Fisheries Development Foundation, and voluntarily participating vessels, monitored an estimated 2% of the catch (on 24 vessels) between 1994 and 2001. In 2002, participation became mandatory as a result of decreasing levels of cooperation from vessel operators and the desire to increase coverage to 4%. In less than a year of mandatory participation, 19 vessels have received observers. Increases in funding in 2002 also allow for expansion of geographic coverage from North Carolina-Florida to New Jersey-Louisiana.

Fostering fisher compliance with federally mandated observer program protocols has proven difficult. Observers encounter more problematic boats in the mandated vessel pool, and the relationship with fishers is more adversarial. Major areas of fisher concern and non-compliance involve provision of safety equipment (especially life-rafts) and acquisition of a Coast Guard safety decal, liability for taking an observer, provision of 48-hour notice of departure, and widespread reluctance to accept female observers.

Laying the Foundation of a New Observer Program

Amy Sierra Van Atten, NOAA Fisheries Northeast Fisheries Science Center, Woods Hole, Massachusetts, U.S.A.

Observer programs can have direct impacts on fishery management decisions, and are generally regarded as the most accurate means of collecting information. The potential effects these programs may have on communities and industries demand thorough planning and accountability. Program managers must have a vision of where an observer program needs to go and must work in a stepwise fashion toward those goals. When starting a program, managers must consider its legality, responsibility, management, funding, impacts, and service.

- Examine the supporting legislation, cooperative agreements, management plans, take- reduction plans, and contracts, and follow the rules and regulations in the program's design, implementation, and maintenance.
- Establish the program's primary goals, explore areas of research that the program can supplement, and mandate how it can support small and large scale initiatives and policies.
- Understand who is responsible for all aspects of the program, such as data security and quality control, data requests, hiring and training, determining sampling procedures, maintaining equipment, and presenting results. Program managers must envision who could be affected by the observer program and how to mitigate those effects. Observer safety, fisher safety, and the program's agenda must be ensured. Some recommendations include, building a library of documentation and using the National Observer Program as support. Timing (know-ing the information in your reference library and having it at your fingertips), outreach, communication, and documentation are critical elements when instituting a new program while building trust and integrity.

Questions and Panel Discussion

Stebbins noted that the common elements in observer programs outweigh the differences, and all face similar challenges. New and existing programs can learn from their common experiences. He considered this panel appropriate for the last day of the conference because it represents a summary of sorts.

A North Pacific program representative asked for additional description of fisher self-sampling. Caslake replied that each fisher takes a single basket sample from a tow, regardless of the size of that tow. The sample is sorted into retained, trash, and discard categories; counted; and the discard is bagged and retained for further analysis. An Australian consultant asked whether fisher self-sampling could be biased, if applied in situations where a fishery might be closed if bycatch levels were excessive. Caslake

noted that since their observer program was a cooperative research study, that situation did not apply. These fishers were interested only in the target species and had little interest in the bycatch. They are currently attempting to build a larger database that may eventually be used to direct vessels away from areas of excessive bycatch.

A representative from the Northeast relayed experiences with fisher self-sampling in the New Bedford area, and wondered what data quality or integrity checks could be implemented. Caslake stressed that these programs should be conducted in conjunction with an observer program, comparing length frequency and volume breakdowns with parallel collections. Data can also be compared with previous data for the same area or vessel. Caslake noted that crews in his study area tend to work for several vessels in the same general area, so that paying and training all crew members in proper sample collection helped to ensure that those skills were available no matter which vessel a crewman was on.

A mid-Atlantic program representative asked how the Shark Fishery Observer Program contacts the more elusive boats, now that the program is mandatory. Vessel owners receive a letter notifying them of the program, and are supposed to return a reply card acknowledging the letter's receipt. Morgan indicated that the program obtains a list from the NMFS Highly Migratory Species section and attempts to reach the operators via telephone. This approach is often unsuccessful, so observers also look for the boats as they move through ports in the region. Graham added that the Gulf and South Atlantic Fisheries Foundation has chosen vessels at random in the past, and some of these vessels are never found.

A Hawaii observer noted that observer data could be biased when safety concerns keep observers off many boats, and asked what the Shark program was doing to correct that situation. Morgan replied that boardings by the U.S. Coast Guard or NMFS Enforcement officers might need to be more frequent, although she was uncertain about the jurisdiction of NMFS Enforcement in drug cases. Van Atten mentioned that the Alaska program had used alternative platforms (skiffs dispatched from a central station vessel) to monitor small boat fisheries, and also suggested that video monitoring might be considered as an option.

A representative of the NMFS Southeast Region welcomed Morgan to the world of mandatory vessel coverage, but recommended a randomized approach to vessel selection, rather than using only friends or volunteers. The latter approach makes it more difficult to maintain professionalism and avoid bias in a mandatory program. Morgan was encouraged to develop a closer working relationship with NMFS Enforcement in the Southeast Region to assist in cases of vessel refusals. A representative of the U.S. Coast Guard also clarified the agency's role in cases of drug and alcohol abuse. The U.S. Coast Guard does monitor for drug use in excess of legal limits; while it does not conduct target patrols for this purpose, it will accept information from individual sources. The NMFS representative recommended that reports be directed to the regional headquarters office, or to a local office if one exists in the port from which the vessel operates. The civil penalty process is usually the only recourse available in these cases.

An Australian program representative asked if changes in vessel behavior due to the presence of an observer had ever posed a problem for Gulf & South Atlantic Fisheries Foundation projects. Graham replied that the shrimp industry does not have room for lack of production. Vessel operators need to make a living, even if they must go to areas of bycatch to do it. There are also fishers with whom a program must work to address particular problems (e.g., gear development), and partnerships have a place in those programs. Random selection can occur once the development stages are completed.

A North Pacific program representative asked Morgan why observers were no longer being encouraged to perform crew work. She replied that in the early days of the program, vessel participation was voluntary, and observers were aboard for long periods, so they were encouraged to do whatever was necessary to make themselves welcome on boats. This practice was discontinued due to liability concerns after the program became mandatory. Graham noted that Gulf & South Atlantic Fisheries Foundation observers were discouraged from standing wheel watches or operating deck gear, but were encouraged to help with other tasks to foster a spirit of cooperation.

An Alaska observer asked what kinds of outreach could make the issue of women on fishing vessels

more palatable. Cusick replied that half of the observers in the West Coast program are female, and that much of the resistance can be eliminated by meeting with the crew and their wives/girlfriends before the trip. Especially on the smallest vessels, female observers should also be given advance warning of the toilet limitations. Morgan noted that meetings with wives/girlfriends were sometimes helpful, but did not always eliminate problems.

A U.S. National Observer Program representative asked how standard data tables can be achieved. Logan acknowledged the "data puddles" resident in different regions, and noted that tables for the Northeast Program came from the commercial catch data. She suggested that a single standard was unrealistic, believing that intermediate translation tables could be used to convert from one format to another. Van Atten noted that the data systems in the Northeast program were used as the basis for the Alaska program. The coding systems used in other observer programs were examined, and the codes used in international coding systems proved to be too long.

A Hawaii observer endorsed greater communication and standardization between programs, which may make it easier for observers to move to programs around the country. Van Atten acknowledged the merits of the idea, but noted that it would take considerable work because the many different programs around the country which all have different goals. It was suggested that observers might consider a website that might list areas where observers are in short supply.

A North Pacific program representative asked how the industry receives the North Pacific data that NMFS already provides. Mikol replied that most of the data are downloaded from the NMFS website and are used for quota management, to project the likely length of openings, or to locate areas of high catch or bycatch. Another North Pacific program representative asked how confidentiality affected release of information to the fishing industry. Mikol was generally unsupportive of confidentiality, believing that it hinders knowledge. He maintained, however, that there are ways to aggregate the data using visual techniques, to compare the data with other sources of data (e.g., sea surface temperatures, currents), and to communicate the data to industry to show trends that do not jeopardize confidentiality. Stebbins suggested that these communications should go back to observers as well. Loefflad noted the North Pacific program has established systems that give fishers access to their own data, and that the fishing industry is one of the strongest proponents of confidentiality.

A NMFS Enforcement representative asked how observer programs can get the best levels of enforcement support, or provide recommendations on how enforcement can help voluntary- or compliance-based observer programs. Stebbins replied that observer providers in Pacific Canada are largely left to their own devices. Enforcement is usually present when issues are critical, but not at other times. Providers like feedback, support, and follow-through from enforcement. Loefflad suggested that the best way to get support is to ask for it. He noted that the North Pacific program has evolved from little involvement with enforcement to a tightly bound interaction, and that enforcement officers have proven responsive when asked for assistance. Course noted that the European program tries to maintain a separation from enforcement since it relies on voluntary access for its scientific work. Gray agreed that conditions are similar in New South Wales, and that research grants forbid involvement in enforcement activities. He stressed the importance of maintaining lines of communication, however, and noted his program keeps enforcement informed of where and with whom they plan to work. Mikol suggested that support of enforcement is very community-specific in Alaska; in many cases support involves maintaining a presence in those communities and knowing the players. A representative of the Canadian Atlantic program noted the evolution toward greater involvement with enforcement in that program. Enforcement officers are now attending briefings in area offices and are trying to become a more familiar presence to managers, scientists, and observers throughout the year.

A NOAA administrative representative noted that the North Pacific program now attempts to influence provider behavior through regulation, rather than contractual control, and asked how that has affected the relationship between the program observer and providers. Loefflad replied that affecting behavior in a regulatory mode requires enforcement action, and that approach takes time, requires considerable information, and can negatively affect

working relationships. Attempts to change the rules can become politicized, because regulations are made through a public rule-making process, and providers have their own views on the issues. Actions to change behavior are generally adverse and tend to erode working relationships. Conversely, contractual relations tend to build working relationships over time.

A Canadian observer asked why the third-party delivery model has persisted in the North Pacific program for 12 years, despite the criticisms leveled at the approach in a variety of forums. Loefflad replied it may be it because the situation is beyond control. He noted that there are no other ready sources for the necessary $12 million. Attempts to develop a fee system in the 1990s were unsuccessful, and it has proven difficult to get consensus on which of the many possible solutions is best.

A representative of the United Nations Food and Agriculture Organization inquired about the chances of promoting future observer programs in the North Sea. Course hoped programs that are as professional as those in the U.S. and Canada could eventually be developed, with industry funding to promote stakeholder ownership. He was opposed to an enforcement role for observers, and hoped that the fishing industry could be persuaded that it is in their best interests to cooperate with such a program in order to avoid mandatory coverage. At current coverage levels, however, observers are unlikely to see much of the bycatch or alter behavior significantly. Ideally, the program would be mandatory, funded by industry, with coverage of 30-40%. Unfortunately, conditions are likely to remain as they are for the foreseeable future.

A North Pacific program representative asked whether enforcement/compliance duties as an inherently government function should be more closely associated with fully government observers, while contract observers should be used for more scientific data collection. Stebbins suggested that enforcement and compliance monitoring were not the same, and that compliance monitoring could be a private-sector task, while enforcement is a public-sector responsibility. Gray noted that observers in Australia are employed as scientists, while Course stated that the low coverage levels achieved in the European program would not be very useful for enforcement purposes.

Stebbins thanked the panelists and summarized commonalities in the presentations into the following list of lessons learned or things to consider:

1. Define your goals and objectives, and follow through with an evaluation of successes afterward.
2. Communicate—with industry, the agencies, and observers.
3. Get industry onboard. Stebbins noted that few representatives of industry were in attendance, and suggested that there should be greater effort to involve industry in future observer conferences.
4. Take care of your observers—this involves safety, compensation, and other factors.
5. Love your data.

PANEL SESSION 9

Is the Risk of Deploying Observers Worth the Data Collected?

Moderator: Jerry Dzugan, Alaska Marine Safety Education Association, Sitka, Alaska, U.S.A
Rogério S. Feio, Universidade de Acores, Horta, Portugal
Carrie N. Horton, NOAA Fisheries, Certified Observer, U.S.A
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Observation Program for the Fisheries of the Azores (POPA)

Rogério S. Feio, Universidade de Acores, Horta, Portugal

The Observation Program for the Fisheries of the Azores (POPA) has been running since 1998 to ensure that the pole and line tuna catches do not involve mortality of cetaceans. Onboard observers cover at least 50% of the tuna boat regional fleet annually. The observers' principal tasks are to collect information regarding interactions of fishing activity with cetaceans and to guarantee the liberty of any potentially hooked cetacean.

The POPA program has provided the first description of the operational and ecological interactions between cetaceans and the tuna fishery in the North Atlantic. It found that cetaceans were present in less than 10% of the observed fishing events, with the common dolphin *(Delphinus delphis)* accounting for 78% of these occurrences. Cetaceans interfered in 5% of the fishing events, mostly resulting in frustrated catches. Nevertheless, fishing events conducted in the presence of common dolphin yielded higher average catches of bigeye *(Thunnus obesus)* and skipjack *(Katsuwonus pelamis)* tuna, suggesting the existence of an association between common dolphins and these tunas.

The observers also collected a wide range of additional information, including fishing effort, tuna and live bait catches, interactions of seabirds with the fishery, and abundance estimates per area and season for tuna, live bait, cetaceans, seabirds, and marine turtles (Figure 13). These have been used as a data source both for fisheries management and conservation proposes. In conclusion, the deployment of observers onboard the commercial fleet has provided a huge volume of high-quality and valuable data that would be impossible to obtain without the program. As POPA showed, the deployment of observers is worth the data collected.

Perspective by an Observer: Four Times Over

Carrie N. Horton, NOAA Fisheries, Certified Observer, U.S.A

Safety is the one underlining principle that stands out in the four different NMFS observer programs in which Horton has participated (Northeast mid-Atlantic gill-net, Hawaii pelagic longline, Alaska pot/longline/trawl, Gulf shrimp trawl). Safety is and should be everyone's number one concern.

The first thing Horton looks for when boarding a fishing vessel is the presence of a U.S. Coast Guard sticker. She relies on her NMFS observer training and her experience, but observers place their lives in many different hands. The U.S. Coast Guard sets standards, some programs rely on coordinators or contractors who assign the vessels to determine safety, but among them it is the

NMFS observer who boards the vessel who makes the final decision. Observer data are not worth the

risk if the safety training provided is insufficient. Observers need to make a better informed approach to the safety of these vessels.

How can in-class training prepare someone for an at-sea disaster? Doing is learning, and learning is being prepared. Videos are a good start, but they are not enough. Hands-on training should be required: donning immersion suits in the water, immersion suit maintenance, in-the-dark survival training, life raft deployment and attachment to the fishing vessel, CPR and first aid skills, radio and communication skills, vessel safety equipment and fire fighting skills, man overboard and EPIRB training, and distress signals. NMFS needs to set a standard safety protocol for all NMFS observer programs to follow. We must also look back at the existing observer programs and see what efforts we can take to make them better. While the data these programs collect are important, observer safety is of highest priority. No reduction of safety in the interest of cutting cost is worth the life of an observer.

Viewing Risk from Different Observer Program Perspectives

Martin Loefflad, NOAA Fisheries, Alaska Fisheries Science Center, Seattle, Washington, U.S.A.

The answer to whether the risk of deploying observers is worth the data collected is very complex and depends entirely on one's perspective. Within an observer program, Loefflad looked at this question from three perspectives: the program manager, the observer, and the observed industry.

The program manager is tasked with collecting data and mitigating risk in its many forms. To the manager, there is a risk of deploying observers (injury, death, conflict, etc.), and a risk of not deploying observers (lawsuits, performance issues, no data for agency analyses and decision-making). Managers make decisions to meet their assigned objectives, while mitigating risk. Often, managers transfer government risk to contractors.

The observer is tasked with boarding vessels and collecting data. Observers face many risks in their job, including injury, conflict, and death, while

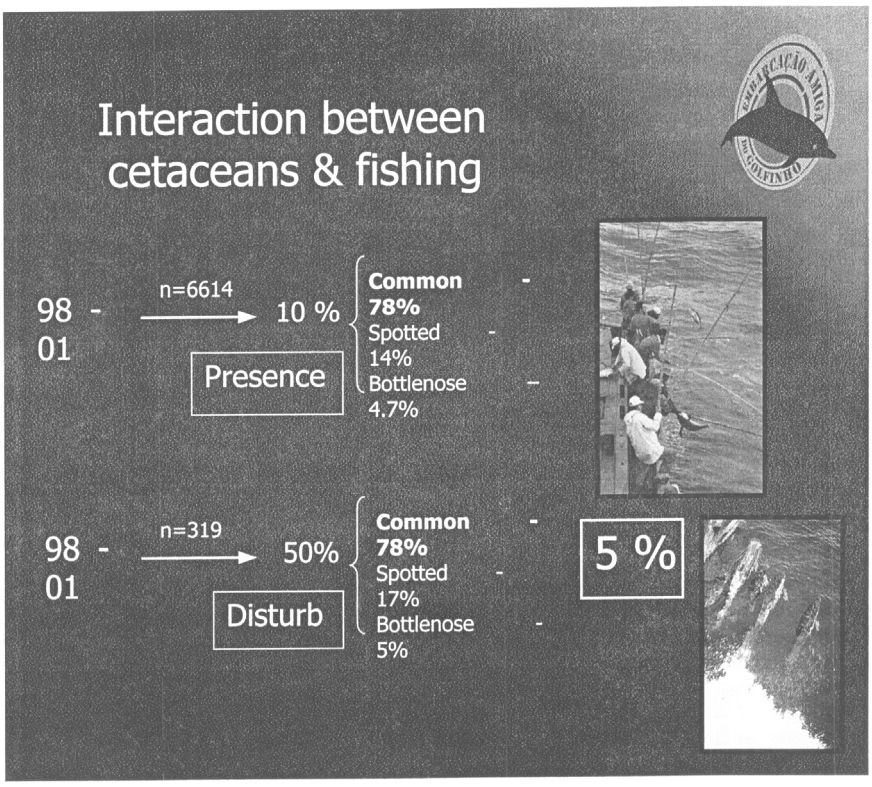

Figure 13. Interaction Between Cetaceans and Fishing.

they benefit from a paycheck, experience, future work, and work that contributes to fisheries management. They must weigh the risk of doing the job against the benefits they obtain. This is an individual assessment, as each person has a different level of risk tolerance, and risk tolerance can change over time.

The industry also has a perspective on risk. It risks disruption of its operations, potentially inexperienced personnel on board, lawsuits from observers injured on vessels, and data that could be used against them. In the Alaska groundfish fisheries, industry must take the risk of carrying an observer or not fish. Industry members stand to gain from the use of observer data in broad fisheries management programs.

From society's perspective, the data observers collect are probably worth the risk. All participants need to evaluate their own levels of risk, take steps to mitigate it, and be their own personal risk manager.

Designing and Implementing Incentives to Improve Safety on "Unsafe" Vessels

Suzanne Romain, Association for Professional Observers, Seattle, Washington, U.S.A.

The Commercial Fishing Vessel Safety Act of 1988 provides standards for equipment and onboard safety training for vessels carrying observers. However, fishing vessels are the only U.S. commercial mariners who are not required to comply with international safety standards. The fishing industry has been resistant to safety standards that address anything more than accident response. Fisheries observers continue to be placed on vessels with undocumented safety problems. Surveys suggest that 53% of observers have been deployed on vessels they thought were unsafe, even though those vessels had a U.S. Coast Guard sticker. Only 35% reported problems to their contractor, and fewer still reported to NMFS. Only 24% had received a safety orientation or safety drill, and the quality of those drills was rarely evaluated. There are few incentives for individual vessels to take preventative measures to improve vessel safety or to meet international safety standards.

The first step in a strategy to refine current systems and introduce financial motivators is to develop a common language. Design a classification system that defines performance standards, safe operating procedures, safe maintenance standards, and safety training/certification standards; expand observer safety training to comply with the International Maritime Organization's Standards of Training, Certification, and Watchkeeping safety standards; and provide regular trainings or refresher courses and a standardized documentation system. Next, design a transparent database of safety problems that can be accessed by all agencies or organizations with a stake in fishing vessel safety (e.g., U.S. Coast Guard, observer programs, contractors, marine insurers, observers). Once these are in place, the financial motivators that could be introduced include data triggers that require safety action (e.g., inspections, training, or vessel modification) for continued observer coverage, data triggers that result in fines, and data triggers that reward operators with reduced rates for necessary expenses, like observer coverage or insurance premiums. The transparent database and common language allow each entity the flexibility to employ the financial motivators that work best for them, provide an accurate representation of the prevalence and significance of safety issues in U.S. commercial fisheries, show how U.S. fishing vessels measure up to international standards, and use resources efficiently by coordinating the strengths and jurisdictions of several entities.

Observer Safety

Gillian Stoker, NOAA Fisheries, Certified Observer, Seattle, Washington, U.S.A.

All recognize that fishing is inherently dangerous. But to determine if the risks are acceptable, one must determine whether (1) the current safety regulations are adequate; (2) there is sufficient training for observers; (3) there are detailed safety reports on each vessel; (4) agency staff are present and capable of evaluating reports and rating concerns; and (5) coverage is waived on unsafe vessels, or information on safety concerns is made available to observers so they can make their own decision (without fear of negative repercussions) whether to board the vessel.

In the first category the response is probably negative. Standards for commercial fishing vessels are lower than those for all other classes of domestic commercial vessels. Many organizations have made recommendations to improve fishing vessel safety,

but the principal safety regulations affecting fishing vessels only require that they carry emergency equipment; they do nothing to prevent those emergencies from occurring.

Knowing that these standards are inadequate makes the need for observer training greater. While observers need not be trained as vessel inspectors, they need to know what to look for, how to recognize dangerous situations, and how to address them if they are present. The North Pacific observer program asks its observers specific written questions regarding the safety of each vessel to which they are assigned, but the information received is often unclear or incomplete. Observers should recognize the importance of their safety reports, and the agency should train its staff to solicit, document, and rate detailed safety information. The agency needs standards to identify those vessels that pose an unacceptable level of risk, and give observers timely access to safety reports on those vessels.

Questions and Panel Discussion

Dzugan reminded observers that they are working in one of the most dangerous occupations in the world. Fishing vessels are largely uninspected, and fishing crews are generally not formally trained in safety, survival, or vessel stability. Yet observing is a growth industry because observers are seen as a good way to manage fishery resources. Observers serve a noble purpose by making fisheries sustainable. Risk managers estimate roughly that for every ten close calls there is one injury, and that for every ten injuries there is one fatality. There has already been one observer fatality in the U.S. and many other close calls. Risk assessors in the U.S. Coast Guard put a value of $1-$2 million on a human life, but Dzugan suspected that most conference participants might view the loss of even one observer as unacceptable.

An Inter-American Tropical Tuna Commission representative asked whether the Azorean observer program considered observing other types of vessels in addition to pole-and-line vessels, since the frequency of dolphin interactions with these vessels is so low. Feio acknowledged that pole-and-line vessels are rarely responsible for dolphin mortality. Dolphins rarely interact with these vessels, they are rarely hooked, and fishers can immediately recognize and cut off any hooked dolphins. The program is required, however, to provide the documentation needed for the product to qualify for the "Dolphin Safe" label. No other vessel types participate in the fishery off the Azores.

During discussion on vessel safety standards, Feio noted that vessels in the Azores fishery are not allowed to go to sea unless they pass a safety inspection. Skippers are also required to graduate from a one-year training program in Lisbon before they are licensed by the government. In such a small fishery comprised of only about 30 boats, it is common knowledge whether a vessel and its skipper are safe.

A representative of the North Pacific program noted that the 1997 observer survey was developed in conjunction, and the data were shared, with the U.S. Coast Guard. She indicated that staff were shocked that the failure to report safety concerns is so high, and wondered whether observers are working to clarify uncertainties in the data with the agency. Romain replied that the Association for Professional Observers is working with NMFS in an attempt to understand the responses and identify where additional training is needed.

A Canadian Atlantic observer questioned why government agencies license vessels to fish in areas that are outside their capability or the skill of their captain. A DFO representative clarified that Canadian vessel licenses are issued by another agency, Transportation Canada, and that there has been a disconnect between this license and fishing licenses in the past, which the agency is trying to correct.

An Alaska Department of Fish & Game representative asked whether observers still feel pressured to board a vessel on which they have noted safety violations (e.g., missing flares). Stoker replied that experiences are mixed. She cited one incident where an observer was reprimanded for boarding a vessel that had inadequate space in its life raft for all crew members, while in another instance an observer contractor was unsupportive when the observer was reluctant to board a marginally safe vessel. Coverage in Alaska is mandatory, and contractors are competing for market share. Observers know that if they refuse to board a vessel somebody else will be onboard within the hour, so the question "Why me?" often changes to "Why not me?" Loefflad added that the presence of a U.S. Coast Guard sticker indicates only that the vessel has the basic emergency equipment onboard at the time of inspection, and that those

stickers are valid for a two-year period. Romain noted that while vessels must have the emergency gear onboard, they are not required to have any other safety procedures in place to receive a sticker. A West Coast observer stated that many observers do not know what is covered by the sticker and may be under the misconception that every vessel with one is safe. Romain noted that programs in the Northeast do not require that the U.S. Coast Guard sticker be present; observers review a checklist of safety items when they board.

The panel and audience discussed several ways to make observers more aware of a vessel's condition. A Northeast program observer noted that Department of Transportation regulations require safety inspection reports to be posted near the drivers of other commercial vehicles, and suggested that something similar might be applicable for fishing vessels. A North Pacific observer noted that the program provides observers with a checklist of safety equipment they should verify before going out on a vessel. Stoker replied that the form is not always used if observers are unable to verify the existence of all the equipment before departure; she suggested that a form requiring the signatures of both the observer and the skipper might be appropriate. Loefflad suggested that observers need to assume some measure of personal responsibility to use existing forms and make the necessary inspections. An Atlantic observer suggested that programs consider a field practical using an unstable vessel to give observers an idea what those vessels are like, but many program representatives were concerned with potential liability issues.

A U.S. observer pointed out the need for encouraging more fishermen to attend these conferences so they can represent their own perspectives on this issue. Horton agreed, but stated that many current fishers have grown up in the industry and are unlikely to see any benefit from obtaining an additional license or training. Romain referred listeners to the book *Lost at Sea: An American Tragedy*[1] for an illustration of the fishing industry's power and resistance to change. Dzugan agreed that the commercial fishing industry is likely to fight the imposition of inspection regimes. Romain restated the need for national standards, and urged an end to the interference of regional politics on this issue.

Loefflad noted the authority of the U.S. Coast Guard over U.S. vessel safety, but questioned whether anyone really knows what constitutes a safe vessel and whether any vessel is really safe. Dzugan acknowledged the lack of standards in this area and the disagreements among the coast guards from different nations; international protocols have been pending for over 20 years. He asked the audience whether there were obstacles to the creation of safety standards in observer programs at the national or international levels; no obstacles were suggested.

Dzugan concluded the session by paraphrasing Sir Walter Scott: "It's not data you're gathering, it's risk." Observers accumulate more risk for each day they spend at sea. Any government action is likely to be a reaction to an event that has already occurred, so Dzugan encouraged observers to be proactive in ensuring their own safety.

[1] *Lost at Sea: An American Tragedy*, by Patrick Dillon, Dial Press, 264 pp.

Conference Wrap-up Session

Cornish opened the floor to questions from the audience. A representative of the North Pacific program inquired whether a centralized observer training academy similar to that provided for the U.S. Coast Guard and the NOAA Corps would be feasible. Cornish responded that the national program had considered both regional and national training centers, but wanted to ensure that training is relevant, timely, and leads to employment upon completion. Demands for observers have tended to arise quickly, and these pulses do not lend themselves well to a national training center. However, observer programs in the U.S. may be growing to the point where there is sufficient demand to provide regularly scheduled centralized training for prospective observers in the basics of safety, first aid, conflict resolution, and seamanship. Program-specific training (e.g., species and gear identification, sampling) would still be left to regional programs. Kulka and Donahue added that DFO has developed consistent national training and certification standards for observers and offered to make these available to interested parties. A representative of the Observer Training Center noted that training on a large scale would be possible, but would require considerable coordination; he recommended that the regional example of the Observer Training Center be used as a model. The Observer Training Center is willing to assist others with design and consultation.

A U.S. observer endorsed the concept of standardized training (e.g., Observing 101 in a community college), and suggested that charging prospective observers a fee for this course may be a way to mitigate the costs. Tork noted that the Northeast program is currently investigating the use of the University of Rhode Island as a training center on the East Coast. The university would like to incorporate the training into its marine technology program. Tork noted that the Magnuson-Stevens Fishery Conservation and Management Act appears to support the concept of regional observer training centers associated with universities. Rogers added that Canadian observer providers are required to offer a basic survival course. Safety is now a high-profile issue within the Canadian fishing industry and at the highest levels of the Fisheries Management Division.

A U.S. Atlantic observer asked what safety training developments observers could hope to see in the immediate future. Cornish acknowledged that Dzugan had worked with NMFS to provide two courses in safety and training techniques for observer trainers. She hopes that refresher courses can be held every few years. Dzugan and Cornish also hope that trainers will work together as co-teachers to share teaching skills and techniques across regions. In the future, Dzugan will review the NMFS safety training programs at the regional level, help develop safety training curricula where necessary, and assist NMFS with risk management planning.

A DFO representative noted that many of the issues raised at this conference are related to how programs are structured (e.g., multi-provider service delivery models) and hopes that senior managers who structure these programs in the future will consider the downstream impacts of current decisions on their staffs. He noted that industry funding was solicited several years ago, and the contractor was required to manage 50 separate revenue accounts to provide coverage. This gave ownership to industry, but does not provide sufficient separation for observers acting in a compliance mode who must now confront the individuals who pay their salaries. A U.S. Atlantic observer recommended that the next observer conference revisit issues associated with service delivery models. The costs and workplace cultures of the different models could be evaluated and their impacts on the mission of fishery management could be assessed. He believes

that many new observers see their positions as a stepping stone into the fishing industry rather than into government service, because the government has not valued their experience.

A Canadian West Coast observer thought she had detected a change in the attitude of the fishing industry toward observers. Observers were resented early on because the fishing industry could see only the resources taken away by the program. Fishers are now discovering that while they once spent days weathering out storms, they now spend less time at sea and go out in better weather because they must also pay for the observer's time. The crew has more time because they no longer fish in areas where much of the catch is discarded. Despite these changes they are still making more money, because the quality and price of fish has improved since the observer program started.

A North Pacific program representative suggested that a television program describing observer programs and their contributions to fisheries management would make interesting viewing.

A North Pacific observer suggested that international observer exchange programs with a follow-up conference of the participants might promote the sharing of ideas. He believes that integration of foreign nationals can promote cultural as well as technical exchange. Loefflad noted that the North Pacific program has received visitors from other countries in the past, some of which participated in observer training, and extended a similar invitation to other programs that may be interested. Stoker recognized that most of the observers currently represented by Association for Professional Observers work in Alaska, and suggested that observers from other areas who are interested in Association for Professional Observers' educational objectives should see its website.

A representative of the Danish Institute of Research suggested that one solution model not considered in this conference involves more extensive cooperation with fishers. By integrating fishers in the planning process, communicating with them during the project, and discussing the findings with fishers and their associations, much of their reluctance to take observers can be overcome. Planning projects with fishers gains their confidence and yields more inside information that can improve the investigation. Danish programs have no enforcement responsibilities and have tried this approach with some success.

Donahue agreed that good communication is important during program design. He noted that Canada uses an advisory committee process to establish management regimes, and its review of the observer program recommended the establishment of an industry committee to examine the design structure of observer programs. He suggested that this process has promoted a mutual understanding of observer program issues and fishing industry concerns. A study report is available.

Cornish acknowledged both NOAA Fisheries and DFO for their financial support of the conference, members of the Steering Committee for their individual contributions and responsibilities, and the Astor Crowne Plaza Hotel and TecuLAN, Inc., for their logistical support. She suggested that there was consensus to continue these conferences and recognized Australia's offer to host the next one. Kennelly was offered honorary membership on the next Steering Committee. Vancouver, British Columbia, was also suggested as a potential conference site. Nance recognized that it will be difficult for U.S. programs to offer financial support for observers and program personnel to attend a meeting in Australia, and suggested that the audience composition at such a conference would likely change. Cornish pledged that the Steering Committee would work to keep the group together.

APPENDICES

Contents

APPENDIX 1

Poster Abstracts

On the Relationship Between Fishermen and Fisheries Biologists

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Fishermen have often, with some justice, seen assessment biologists as representatives for the authorities, laying down restrictions for the fisheries and preventing the fishing industry from carrying out the kind of fishery that the fishermen find most appropriate. Fisheries biologists, on the other hand, tend to regard fishermen as greedy moneymakers, squeezing out every penny of the fishery, showing no respect for the fish stocks and the sustainable utilization of the resource.

Very often this disagreement is a result of:

- An endemic mistrust of each other, which is built up during decades of misunderstandings and lack of real knowledge of the work and the motives of the other party.
- A different time frame for looking at the fishery. The task for the fishery biologist is, in the long term, to assure a healthy fish stock within safe biological limits (reference points) and thereby give the fishing industry the possibility of a steady fishery and a harmonious development of the industry. The fishermen on the other hand, find it difficult to accept regulations, which, in the name of long-term management, often have so severe an impact on his income that his ability to support the family is endangered. His outlook is short-term and in extreme cases only to his next mortgage repayment.

Very little can be done about the short- and long-term point of view respectively, but an extensive cooperation between the Fishermen's Organization in Denmark and the Danish Institute of Fisheries Research (DIFRES) has demonstrated that something can be done in order to break down the circle of mistrust. The effort has developed from cooperation purely concerned with planning of discard sampling schemes to other matters as general assessment model input, general informal exchange of attitudes and positions and the undertaking of common research project. The article describes the development from the beginning in 1995 to the present; the benefits obtained and the problems discovered. The relationship between biologists and both ordinary fisherman and the leadership of the Fishermen's Organization are discussed in the article.

OLFISH: Commercial Electronic Fishery Management System: A Demonstration of a Unique, Wheelhouse, Electronic Solution for the Collection, Management, Presentation and Utilization of Commercial Fishing Data.

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Fisheries management is continually frustrated by the lack, or poor quality, of critical data on fish catches, sizes, fishing locations, and relevant environmental conditions. While quantitative methods for managing fisheries have developed considerable complexity, the quality of the available data remains an obstacle to meaningful advances in fisheries management. There are a number of aspects to the problem. The first is the absence of a flexible and comprehensive system for capturing essential data during fishing operations. A large amount of environmental data is lost simply because of the difficulty of recording this information easily in real time. This is despite the advent of a complex array of sensory equipment available in the bridge of modern fishing vessels. As a result, environmental patterns become part of skippers' experience, and seldom if ever become formally available to scientists or managers of fishing operations.

The authors have also found in their scientific work that much energy is wasted and important opportunities lost because of the uncertainty surrounding crucial historic data. For example, there are typically many factors related to catch-per-unit-effort data, a key index of trends in resource abundance, which are not recorded, and hence cannot be incorporated in statistical analyses. Frequently, these missing data are crucial to management decisions.

For scientists unreliable data leads to poor basis for stock assessment models and management programs. For industry the lack of sound data significantly reduces its fishing efficiency, since past performance cannot be studied properly. Hence poor management decisions based on unreliable analyses are made, often with substantial cost and risk to fish resources and the fishing industry. Although there is presently greater awareness amongst scientists and fisheries managers about the importance of collecting fishing data there is still confusion about exactly which data are needed, and how to collect and store them. It is common for skippers to record scientific data on one form, for shore managers to use another for commercial purposes, and for skippers to keep separate fishing logbooks. These data are then transferred to different computer systems, often complex spreadsheets, or sometimes are left in paper format in large inaccessible books and files. There is a degradation in the quality of data because of the multi-stage process of transcription from handwritten logbook sheets to paper forms and then to computer databases. The most logical first point of data entry, the fishing vessel skipper, should occur in digital format directly into a computer. One of the difficulties with fisheries data is the complexity of the logical linkages between the different types of data. Any reasonable approach to the problem requires the use of modern relational databases able to address the multidimensional complexity of the problem.

The authors developed an electronic, fishery data management system, named OLFISH. OLFISH is a software program for capturing, storing and summarising fishing data. It can be used by skippers, managers and scientists during fishing operations and for scientific surveys. It provides a comprehensive, user-friendly means of compiling data reports. One of the most important features of OLFISH is its ability to eliminate the need for paper logbooks. OLFISH empowers its users to become an equal partner in the management of its resources by giving them a very powerful tool to collect and understand fishing data. It also transfers each vessel in the fleet into a research station able to collect vast amount of valuable data with accuracy and minimal effort.

New England and Mid-Atlantic Fisheries Observer Program

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Contractor: AIS, Inc., 49 Mechanics Lane, New Bedford, Massachusetts 02741, USA, (508) 990-9054

Mandate

The MSFCMA, MMPA, ESA, and the ACTA authorize Observer coverage to collect data relevant to incidental takes, by-catch, stock assessment, and other protocols.

The Northeast Fisheries Science Center, NMFS has contracted with AIS, Inc. to provide observer coverage on a variety of fisheries pursued from North Carolina to Maine. The poster will include photos of the different gear types used (otter trawl, gillnet, bottom longline, scallop dredge), and will show observers working at sea. Text accompanying the photos will detail the different fisheries and different coverage requirements, and a Program Management overview.

Monitoring Programs in the Trawl Fishery on the West Coast of Canada

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In the past decade trawl fisheries have come under increasing pressure to increase their accountability for impacts on target and non-target species. This holds true for the trawl fishery conducted on the West Coast of Canada. This trawl fishery is comprised of a number of different sectors harvesting a highly complex community of groundfish from both the shelf and slope environments on Canada's west coast. Prior to 1994 the only data available from the fishery was through a voluntary fishing log program and industry generated sales slips. Due to concerns about the credibility of these data sources, beginning in 1994 industry was required to fund an independent dockside-monitoring program. This program provided 100% industry independent verification of landed weights of all species brought to the dock. This effort provided a reliable data stream for landed catch but did nothing to address what was happening at sea. In the fall of 1995 the fishery was closed due to concerns regarding quota overages for a number of the target species. The concern being that the landed catch figures only represented a portion of the true impact of the fleet due to persistent reports of discarding at sea. The fishery was allowed to reopen early in 1996 under an at sea monitoring regime, which included 100% coverage of the offshore trawl sector, co-funded by industry and government. The primary objective of this program was to collect credible data on catch and releases of all organisms encountered. Although difficult for industry to accept, at first, this program paved the way for the introduction of individual quotas for this fishery in 1997. IQ management required the tracking of 59 unique species/area quotas for each participating vessel. The observer program already provided this data and allowed for a seamless transition to the new management style. Together, monitoring programs and IQ management have proven to be extremely beneficial for industry and have facilitated their role as stewards of Canada's west coast groundfish resource.

This poster outlines the current monitoring and data collection processes in place for Canada's west coast trawl fishery, the agencies involved and the many uses of this data.

Seabird Training and Verification in the North Pacific Groundfish Observer Program

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Training and Tools

Potential observers must have a four-year degree from an accredited institution in the natural sciences or related field. Observers in the North Pacific Groundfish Observer Program (NPGOP) attend a three-week training prior to deployment on fishing vessels in the Bering Sea and Gulf of Alaska. During this intense course observers are trained in sampling protocols and procedures, fish, marine mammal and seabird training. The seabird portion of the training incorporates a power-point presentation with lecture and hands on use of study skins. The observer manual contains a seabird chapter covering priorities and protocols. Additional requests for information are given to the observers in the form of handouts. Observers are provided with the 'Beached Bird Guide' for the identification of dead seabirds. Each calendar year, prior observers attend a 4-day briefing before being deployed. Seabirds are covered in these briefings, with emphasis on the three albatross species.

Specimen Collection

The NPGOP is working with the U.S. Fish and Wildlife Service (FWS) and the University of Alaska Fairbanks to collect seabird specimens for a variety of demographic studies, including age and sex ratios, tissue samples for archiving and study skins and mounted birds for teaching or long term collections. This collection is for northern fulmars, laysan and black-footed albatross. Collection kits with instructions are provided to observers.

Photo Identification

Disposable cameras with ID forms and training are provided to select new and prior observers.

Seabird ID Form

These forms mirror the "Beached Bird Guide" and will incorporate bill outlines and key characteristics for the primary groups of birds seen in Alaska waters.

Debriefing

Data collected during each cruise, including seabird identifications, are reviewed and corrections made during the debriefing process.

Spatial-Temporal Variation of Seabird Bycatch in Alaska Longline Fisheries: Non-traditional Uses for Fisheries Observer Data

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Seabirds are long-lived species with high survival rates, delayed maturity and low fecundity. Seabirds spend most of their lives at sea, returning to land only to breed. Because of these life history characteristics, seabird population stability is inherently vulnerable to small increases in adult mortality. Seabird population declines have occurred due to a multitude of anthropogenic impacts as well as local and global climate events. Commercial fishing is an impact that can potentially be controlled.

Seabirds are most vulnerable to longline gear as it is being deployed; baited hooks remain near the surface where they are easily accessed by surface-feeding seabirds. Occasionally, seabirds are hooked and drowned. Seabird bycatch by Alaska demersal longline vessels ranges between 10,000-27,000 individuals per year. Management efforts to reduce seabird bycatch are driven by concern for all three North Pacific albatross populations, especially the endangered short-tailed albatross (*Phoebastria albatrus*). However, northern fulmars (*Fulmarus glacialis*) and gull species (*Larus* spp.) dominate seabird bycatch (75-90% of total) with much smaller proportions of albatross and shearwater species (*Puffinus* spp.) caught.

Management agencies have characterized seabird bycatch in the Alaska longline fishery on spatial and temporal macro-scales (i.e., 1000's of km and year) but meso-to-coarse scale patterns (i.e., 100's to 10's of km, respectively) and the potential correlation with underlying forcing factors, such as seabird ecology or association with oceanographic features, remain unexplored.

The objectives of the project are to:

- Characterize seabird bycatch rates in Alaska longline fisheries on a range of spatial and temporal scales using 1995-2000 commercial fishery data;
- Construct a multivariate model to examine the influence of a suite of variables on seabird bycatch rates.

Variables will include three broad categories: fisheries-related factors, physical/oceanographic variables and seabird ecology.

As emphasis on the reduction of seabird bycatch in Alaska and within the North Pacific basin continues, a comprehensive understanding of mechanisms driving seabird bycatch is essential for both fisheries and seabird managers to make informed choices when establishing tools to reduce seabird bycatch.

NOAA Fisheries Observer Trainers Use the Marine Safety Instructor Training Course Offered by the Alaska Marine Safety Education Association (AMSEA)

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The Marine Safety Instructor Training Course offered by AMSEA includes vital instruction in the following:

Safety Curriculum	*Methods of Instruction*
cold water survival skills	conducting effective demonstrations
signals	audiovisual aids
abandon ship and life rafts	guest instructors
shore survival	problem students
USCG helicopter rescues	cross cultural communication
firefighting	effective instructors
drills on board vessel	putting on a course

AMSEA is currently the only marine safety training organization in the U.S. that offers a U.S. Coast Guard (USCG) approved Marine Safety Instructor Training course. NOAA Fisheries has incorporated USCG requirements for vessel safety in the Observer Health and Safety regulations (600 CFR Part 746), and considers the USCG certification of Marine Safety Instructor Training (MSIT) to be an essential minimum requirement for any marine safety instructor training course provided for observer trainers.

AMSEA has a proven performance record and direct experience with the training of NOAA Fisheries observer trainers, and has a curriculum usable by the government without modification, time delay, or additive cost. AMSEA also has experience in setting regional, national, and international standards for marine safety instructor training. NOAA Fisheries uses the AMSEA MSIT course for the safety training of fisheries observers.

The safety training curriculum has been proven effective at saving lives. In a 1995 independent study of over 1,700 fishermen that had been AMSEA trained, not one had been involved in a fatality. The chance of this survivability rate happening by accident was less than 4%. However, when a follow up study was done in 2002, the difference in survival between those given safety training or not was negligible if training was more than 5 years old. This highlights the need for continuing refresher training.

Observation Program for the Fisheries of the Azores (POPA)

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Nowadays, the dolphin safe label is a requirement of the Tuna Can industry, created by the pressure of the international public opinion. Since 1989, all species of cetaceans in the Azores, similarly to what happens in all the national territory, are fully protected by regional, national and international laws. Although protective legislation does exist there has been in the past few years a great controversy advertised by the national and international media concerning the capture of dolphins by Azorean fisherman. Following these, the Marine Research Centre (IMAR) of the University of the Azores was contracted by the Azorean Regional Government, the Association of the Tuna–Vessel Proprietors and the Association of the Tuna Can Industries to carry out a monitoring program of the fishing activity in the Archipelago. This program was put into force with the collaboration of the Earth Island Institute. In 1998 the Azorean Fisheries Observer Program (POPA) was initiated with the main objective of guaranteeing the "dolphin–safe" certificate to the Azorean tuna fishery. This was carried out by placing observers aboard all tuna–vessels and ensuring a minimum of 50% coverage of the fleet. The main task of the observers has been to report on the interaction between cetaceans and the fishing activity, and to assure that there was no direct take. Taking advantage of the presence of observers aboard, POPA also collects data to assess the distribution and relative abundance of cetaceans, marine turtles and seabirds, and biological data on tuna and other pelagic fishes. The purpose of this poster is to show the outputs of POPA.

Data Bias in the North Pacific Groundfish Fisheries: Recognizing and Adjusting Observer Sampling Techniques for the Collection of the Best Available Data

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Bias is any partiality or subjectivity, but when associated with data, it generally has negative connotations and is viewed as something to be avoided. Fishery dependent data, such as observer data, reflects the characteristics of only the harvested population. Therefore, bias in these data is inherent, unavoidable and reflective of commercial fishing practices. This poster will explore some of the biases introduced into North Pacific groundfish observer data and the steps taken by the Program and observers to understand, account for, and reduce them whenever possible.

Bias is introduced in many aspects of commercial fishing operations. In all but a few restricted access fisheries, management regimes and federal fishing regulations in the North Pacific require fixed levels of observer coverage, depending on vessel size. Fleet wide, observer coverage is not randomly assigned or distributed and vessel operators choose when to carry an observer if their vessels require less than 100 percent coverage. When an observer is aboard, vessel operators may have incentives to change fishing locations or operations in order for data collected to meet management and regulatory requirements. Individually, observers take steps to minimize any biases that may be introduced by deck or factory configuration, space, time or access constraints, stratification of catch in holding areas, or subjectivity in sample selection. Observers have become skilled in inventive ways to collect the best data available. Even so, observers are not able to combat all sources of bias, so recognition and documentation become important skills. During debriefing, Program staff ensure that this documentation is complete and that sources of bias are detailed in our database. Staff are aware that commercial fishing vessels are far from perfect sampling platforms, and observers may need to sample in a non-random manner in order to collect their data. Although we accept that bias is inevitable, we do not accept all biases equally. When collection methods are deemed inappropriate or the data are judged to be biased in a manner where the accuracy is compromised, the data are held in database tables that are not available to stock assessment scientists and fishery managers.

At-Sea Catch Weighing in the Alaska Groundfish Fisheries

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The NOAA Fisheries Alaska Region has the largest at-sea catch weighing program in the world. During 2001, for example, NOAA Fisheries approved scales were used to weigh 767,000 mt of fish on 27 factory trawlers. Catch is weighed prior to sorting on motion compensated flow scales that are capable of weighing fish at rates of up to 80 mt per hour. The scales are inspected annually at the dock by NOAA Fisheries inspectors and are tested daily by the vessel crew when their use is required. An observer monitors catch weighing and scale testing. The program has been largely successful and gives highly accurate estimates of overall total catch. This presentation will give an overview of the catch weighing system that we have implemented and discuss how it interfaces with the North Pacific Groundfish Observer Program

Spatial and Temporal Patterns in Trawling Activity in the Canadian Atlantic and Pacific

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Fisheries Observer data within a Geographic Information System (GIS) framework was used to spatially analyse trawling in Canadian Atlantic and Pacific waters as part of a program to assess the effect of trawling on benthic habitats of the Atlantic and Pacific. Data from the Canadian Fisheries Observer Programs for the period 1980-2000 (Atlantic) and 1994-2000 (Pacific) in the form of geo-referenced fishing set locations were used to spatially describe trawl effort location. The results are presented as a series of maps depicting the spatial distribution of trawling intensity. Further analyses delineate temporal changes and patterns in trawling intensity. Areas that were repeatedly or intensely trawled over the entire period were identified. In the Atlantic, trawl grounds are patchy and complex covering between 8 and 38% of the shelf in any year although actual trawled bottom area is much smaller. Spatial patterns of trawling changed quite dramatically over the time sequence analysed but locations of high intensity trawling were quite similar from one year to the next. The spatial patterns were most stable during the 1980's while the greatest changes occurred during the early 1990's. There were numerous persistent areas of trawling spread mainly along the shelf edge and between the banks. Except for the Grand Bank and the Magdelen Shallows, the tops of the banks were untrawled. Thus, a substantial portion (shallow and shoreward) of the shelf was consistently un-fished. In the Pacific, the trawl locations were more consistent but the observed timeframe was much shorter (1994-2000). Trawl grounds comprised a string of partially joined patches along the shelf edge off Vancouver Is., three patches within the southern Queen Charlotte Sound, south and east of Queen Charlotte Is. At deeper locations and on the shelf edge north and west of Queen Charlotte Is. (Dixon Entrance). The results show how observer data can be used to quantify trawl effort by providing precise information on the extent and intensity of trawl activity.

Developing and Implementing Observer Technologies in the North Pacific

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The best mix of observer presence and compatible technologies depends upon the information needs of the management agency and the resources available to it. Much of the data collected by observers in the North Pacific Groundfish Observer Program (NPGOP) is critical to our in-season management structure of quota management. Because observer generated data are the cornerstone to these systems, the NPGOP has invested heavily in technical developments to enable observers to enter their data at sea and transmit it rapidly back to the database located in Seattle. At this time, NOAA Fisheries maintains its own custom data entry application on industry provided computer hardware on vessels and at processing plants. The technologies we developed and implemented were designed to improve overall data quality and enable it to be transmitted to us rapidly. They also enabled us in having more frequent direct e-mail communications with observers at sea. This improved both observer support and data quality by having editing and error correction, and providing a personal staff advisor to the observer at sea. But, the driving force behind the use of technology was the great demand for timely, high quality data. If our end users had less of a need for timely data, we may not have made these long term investments of technology and technical staff because it was expensive. Currently most observers send us the data daily and we then use database technologies to make the information available to our internal data users, and web technologies to distribute them to the fishing industry members who also use observer generated information. The industry use of observer data was another great secondary use. The rapid acquisition of quality observer data enabled implementation of several management systems such as Community Development Quotas (CDQ) and the American Fisheries Act (AFA). NOAA Fisheries in the Alaska Region also developed weighing technologies, which negated the need for observers to make total catch estimates in the CDQ and AFA fisheries. This shift in work gives the observers more time to focus their efforts on the important catch composition sampling, which still requires a trained and capable observer. Other simpler technologies in observer gear offer many advances in improving observer work. All technical developments, however, must be balanced with the cost of developing and implementing them.

Forget Paper Forms! Provide Observers With Hand-Held Computers and Appropriate Software

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What technology should we provide observers for recording their data? Pencils or computers? The ideal data entry situation from the point of view of reliable data is for the observer on the vessel to enter data directly into a computer, not onto paper log sheets. With observer-entered data there can be timely feedback on readability and reasonableness of entries. The observer can correct many errors immediately while the situation is still fresh in mind. This would avoid the situation of a third-party land-based data entry person making a mistake interpreting handwriting weeks or months after the trip and having to check back with an observer whose memory was dimmed by a number of other trips since the one in question. Was the fluke on haul 23 of trip 44 really more than one meter long? Was haul 12 on trip 27 really 15 miles?

At the Northeast Fisheries center we have been moving towards direct entry of data at the field site: marine mammal sighting trips have depended exclusively on such data entry for 8 years, groundfish surveys have changed to field data entry in the last year, and the fisheries observer program is actively developing a pilot for their more complicated data entry. Industry hardware and software are converging to provide reliable, standardized and more affordable platforms. A system's success is directly related to its suitability to the idiosyncrasies of the project. There are clearly a number of technical and budgetary hurdles to leap. We can offer both answers we have found as well as questions that remain with us.

An Overview of the Northeast Fisheries Science Center Observer Effort and Protected Species Takes for 2001

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The National Marine Fisheries Service, acting under the authority of the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Atlantic Tuna Convention Act, is responsible for the management of fisheries in the territorial waters of the United States. One facet of fishery management is the collection of fishery data, at sea, by observers. The Northeast Fisheries Science Center's Fisheries Sampling Branch is responsible for the collection, processing, and management of observer data from various fisheries ranging from Maine to North Carolina. These data, collected aboard commercial fishing vessels, include information on the fishing operations, fishing effort, catch, discard, by-catch, economics, and vessel efficiency.

This poster presents data on observer effort and associated takes of protected species collected from the year 2001. Observations such as target species in relation to gear types (gillnet and otter trawl) and percentages of observer coverage working with these gear types are plotted on a regional map. To provide an understanding of how data is used throughout the Northeast, a flow chart represents how the data migrates from the observers to end users. A partial list of end users is also included.

Additionally, we plot the locations where protected species were caught accompanied by a table of takes by gear type, season, and geographical area.

Observer Safety Reports by Fishery and Gear Type

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The 17th and 13th USCG Districts have worked with the National Marine Fishery Service Observer program to develop basic safety training for observers, and to establish effective processes for investigating and resolving safety problems or concerns reported to NMFS by observers.

Part of the debriefing process for observers includes questions regarding safety concerns. The results of these safety debriefings are currently shared with the USCG. USCG Marine Safety Office Anchorage uses the information to better plan Commercial Fishing Vessel Safety Exam activity, and occasionally initiates boarding activities that lead to the correction of serious safety problems.

This poster presentation identifies safety problems reported by fishery and gear type. This poster will give observers, contractors and observer program coordinators insight into safety concerns and accident trends in specific fisheries and gear types.

Species Identification: Why Bother?

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Historically, Fisheries Observer Programs (FOPs) have been primarily concerned with stocks of "commercially valuable" marine species. Consequently, adequate training and technical support of Observers in identification of bycatch species was never a Program priority. Observers were essentially "cast adrift" at sea with respect to identifying non-commercial species, often without proper identification materials to do so. However, given the recent groundswell of public interest in threatened and endangered marine species (at risk of entrapment by commercial fishing gear), scientists and environmental agencies are now utilizing historical Observer data to investigate population trends of species at risk. Yet Observers were never tasked historically by FOPs to determine accurately all species that occurred in a catch: some of which are now under intense public scrutiny. If species-specific Observer data will continue to be used as input critical to the population management of declining and disappearing "commercially unimportant" marine species, then government managers and administrators of FOPs must adopt species identification as another priority integral to the validity of future Observer-collected data. Cost-effective partnerships with internal non-FOP species experts and external academic institutions are discussed as part of a 3-Step Plan to provide Observers with a standardized continuum of expanding species identification knowledge and high-quality materials.

Collaborative Roles of the North Pacific Groundfish Observer Program and Alaska Fisheries Enforcement

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The combined efforts of the NOAA Fisheries, North Pacific Groundfish Observer Program Office (NPGOP), and NOAA Fisheries, Alaska Region Enforcement Agency (AED), work hand and hand to gain regulatory compliance that provides observers an environment suitable for gathering high-quality data for fisheries management. This is accomplished through training, public outreach, and strong support of observers.

Observers are the eyes and ears of the Fisheries Program and their ability to recognize and document violations is essential. Strong support of observers by the Agency is critical so they feel protected from forms of retaliation or harassment for reporting violations. Without the observers' compliance role, many violations would go undetected and would not be prosecuted. Enforcement's highest priority is to investigate and prosecute egregious violators who are damaging the resources. Observers are trained to recognize a wide variety of violations with emphasis on observer safety, harassment, interference and sample bias. NPGOP staff members receive training on compliance issues, enhancing observer assistance in the field as Cadre personnel, in season advisors, and during the debriefing process. The NPGOP provides a near seamless integration of information to its sister agency with improved data resources using its innovative NORPAC database, coupled with the Program's Compliance Liaison Office. AED has increased the numbers of agents and officers working observer-generated cases since 1999. Most observers view enforcement personnel as valuable, trusted personnel to assist in difficult situations.

Any observer program should include strong efforts toward public outreach. This promotes the effective flow of information and establishes trust and understanding with industry. The NPGOP and AED meet regularly with industry members to solve problems and educate industry on regulatory issues such as seabird deterrents and observer responsibilities.

Together, the united efforts of the NPGOP and AED are effecting positive change to insure the sustainability of Alaska's living marine resources.

California Drift Gillnet Observer Program: 10 Years of Data Collection, 1990-2000

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The 1988 and 1994 amendments of the Marine Mammal Protection Act designate the California commercial drift gillnet fishery for thresher sharks and swordfish as a Category I Fishery under the Marine Mammal Authorization Program due to having frequent serious injuries and mortalities of marine mammals incidental to commercial fishing. In 1990, under this authority, the National Marine Fisheries Service, Southwest Region began placing biological technicians (observers) onboard California swordfish/thresher shark drift gillnet vessels. From July 1990 to present, 16 training courses have been held with over 130 observers prepared and geared for sea. To date, these observers have completed 966 vessel assignments (5580 sets observed) for an overall fleet coverage of 14% (1999, 20% and 2000, 20%).

With the observers' primary duties to document fishery interactions with marine mammals and endangered species (sea turtles), Southwest Fisheries Science Center (SWFSC), Coastal Marine Mammal Division, biologists initially designed collection protocols to validate reproductive rates and determine stock structure of the associated marine mammal species. Observer specimen collection has included: cetacean and pinniped whole carcasses, or heads, stomachs, gonads, adrenal glands, and tissue biopsies including sea turtle tissue biopsies. Also at the inception of this program, SWFSC, Pelagic Fisheries Division, biologists designed a protocol for collection of life history and distribution data on swordfish (*Xiphias gladius*), marlins (primarily striped *Tetrapturus audax*), and pelagic sharks (primarily common thresher *Alopias vulpinus*, shortfin mako *Isurus oxyrinchus*, blue *Prionace glauca*). These data and collections now form the basis of several ongoing life history and distribution projects. Observer specimen collection has included: swordfish and marlin specimens of tissue biopsies and gonads, and pelagic shark specimens of vertebrae, gonads, stomachs, and tissue biopsies.

Due to this fisheries' interactions with several strategic marine mammal stocks, the Pacific Offshore Cetacean Take Reduction Team (TRT) was formed to prepare and implement a Take Reduction Plan (TRP). The TRP's goal is to prevent the depletion and assist in the recovery of these strategic stocks. In 1996, the TRT recommended that the observer program conduct an experiment to determine whether pingers (acoustic deterrent devices) attached to the floatline and leadline of the drift gillnet would be effective in reducing cetacean entanglement. After two seasons of the experiment, the overall cetacean take dropped by 65% in 1997 and 89% in 1998.

Observed Pelagic Shark Catch in the California Drift Gillnet Fishery

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The California commercial drift gillnet fishery for thresher sharks and swordfish began in 1977. Peak landings occurred in 1982 and 1983 followed by continuing decreases resulting from legislation including, limiting entry of new participants, gear constraints, and time/area restrictions within the 200 nm EEZ. The focus remains on swordfish with over 95% of fishing sets listing swordfish as the primary target species. Thresher shark regulations continue today and now define the primary fishing season from August 15 to January 31. In 1990, the National Marine Fisheries Service, Southwest Region began placing biological technicians (observers) onboard California swordfish/thresher shark drift gillnet vessels. Observers' primary duties are to monitor fishery interactions with marine mammals and endangered species (sea turtles). At the inception of this program, Southwest Fisheries Science Center biologists designed supplementary data and specimen collection protocols for pelagic sharks and swordfish. These data and collections now form the basis of several ongoing life history projects. Observed fishing effort and catches of pelagic sharks along the west coast are described with a summary of observed life history information. The observed catch of valuable target species and other marketable bycatch are presented as are the observed bycatch of discarded species.

Applications of Data Collected by Observers during Eastern Bering Sea King and Tanner Crab Fisheries

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At-sea observers are an integral component of commercial king crab *Paralithodes* spp., Tanner crab *Chionoecetes bairdi,* and snow crab *Chionoecetes opilio* fisheries management in the eastern Bering Sea. The Alaska Department of Fish and Game (ADF&G) maintains varying levels of observer coverage on crab fishing vessels and processors to aid in achievement of short-term and long-term management objectives. These objectives include I-season assessment of fishing performance, general biological knowledge of shellfish and bycatch for developing harvest strategies and establishing regulatory policy. This poster provides an overview of the high profile uses of shellfish observer data including the development of models for estimating relative stock abundance, producing preseason projections of fishery performance and various life cycle and biological applications (Moore et al. 2000).

Scientific Observer Program Initiated by European Freezer-Trawlers in Order to Estimate the Pelagic Fish Resources off Mauritania, Northwest Africa

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The coastal waters of Mauritania contain large numbers of pelagic fish such as sardinella, pilchard, mackerel and horse mackerel. A local fishery has hardly been developed and exploitation of these resources is contracted to foreign companies. Today about eight freeze-trawlers from the European Union (EU), mainly of Dutch origin, are active in the area year-round. Total catches by this fleet are in the order of 150,000 tonnes per year, most of which consists of sardinella (76% in the year 2001).

In 1998 Dutch ship owners commissioned a study by the Netherlands Institute for Fisheries Research (RIVO) into the long-term potential of pelagic species in Northwest African waters (Morocco, Mauritania, Senegal). This study has gradually expanded into a joint research project with the Mauritanian Institute for Research on Oceanography and Fishery (IMROP, former CNROP) at Nouadhibou.

Part of the project is the "Scientific Observer Program" to estimate the total catch of the EU fishery for small pelagics in the Mauritanian Exclusive Economic Zone (EEZ). A team of two IMROP scientific observers monitors the catches and fishing methods of an arbitrarily chosen freeze-trawler. At least one team will be at sea at any time. The observers collect detailed information about the amount and composition of catches and discards, including length-frequency distributions, and also on accidental by-catches of large animals such as dolphins and sharks. Furthermore, target species (sardinella, pilchard, mackerel and horse mackerel) are analysed on biological conditions such as sex and maturity stage. These studies, in combination with landing data of the EU freeze-trawlers provide detailed information about the EU pelagic fisheries in the Mauritanian EEZ.

The "Scientific Observer Program" thus constitutes an important contribution to the FAO working group for small pelagics in West Africa.

2002 Alternative Platform: Investigating Interactions Between Chesapeake Bay Pound Nets and Sea Turtles

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Chesapeake Bay and the coastal waters of Virginia provide an important summer habitat for juvenile Loggerhead sea turtles. Turtles migrate into the Bay throughout late May and early June when water temperatures reach 16–18 °C. Sea turtle mortality has been documented annually during this migration period. The magnitude of these stranding events has increased over time, and despite this increase, the exact cause of the mortalities has not been determined. Turtle necropsies conducted by the STSSN (Sea Turtle Stranding and Salvage Network) concluded that the majority of the stranded animals were healthy at the time of their death, suggesting that disease is not an obvious cause. Of the remaining hypotheses that could explain the mortalities, one is that this may be a fishery related event. Which fishery, or combination of fisheries, associated with these strandings was unclear. Multiple fisheries are active in the Bay and in offshore waters and to effectively reduce the annual mortality event and to determine if, and how, an observer program might function in this process, NMFS staff first identified and characterized all fisheries in the bay. After looking at these fisheries pound nets seemed to pose the greatest threat to sea turtles.

Sea turtle mortalities have been documented in large mesh (8–16" stretched) pound net leaders and leaders with stringers. Strandings have also been documented adjacent to pound nets. In addition, both live and dead turtles have been reported at the surface in the pound section of pound nets. Based on these observations NMFS staff and contractors at VIMS concentrated on first characterizing the pound net fishery and then monitoring it during the spring of 2002. The characterization phase included all pound nets in Chesapeake Bay. Information collected included net description, location, mesh size, water depth, proximity to the shore and other parameters. During the monitoring phase of this project over 600 net surveys were conducted, during which time seven entangled turtles were documented. The results of this investigation are consistent with previous studies suggesting that the pound net fishery negatively impacts sea turtles in Chesapeake Bay. We recommend an alternative platform observer program as the most appropriate method for obtaining accurate, real-time information on pound net/sea turtle interactions.

APPENDIX 2

Observer Program Overviews

ARGENTINA

Argentinean Observer Project (INIDEP)

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Fishery Description

In 1997, the Argentinean total landings reached a peak of more than 1,400,000 metric tons (mt). In 2001 they decreased to 865,816 mt. The main species caught are hake (*Merluccius hubbsi*) with 28.7%; squid (*Illex argentinus*) 26.5%; hoki (*Macruronus magellanicus*) 12.9%; blue whiting (*Micromesistius australis*) 6.2%; kingclip (*Genypterus blacodes*) 2.3%; shrimp (*Pleoticus muelleri*) 9.0 %; and other species 14.4 %. These landings represent more than 890 million dollars of export value (more than U$D 400 million from shrimp). The fleet has almost 700 units (89 factory trawlers plus 5 surimi trawlers, 59 outriggers, 20 long-liners, 101 jiggers, 133 shoreside delivery trawlers, 102 coastal ships between 18 and 23 m, and several coastal boats less than 18 m length. The hake, historically our main resource, is under risk of collapse affected by: overfishing; overcapitalization; flaws in controls and management, high uncertainty, etc.

Observer Program Management

The INIDEP Observer Program began in 1994, covering the different fisheries. In spite of the fluctuations that we have been suffering from for 7 years, we have been able to develop ourselves as a work group, learning from our experience and the observers. The submitted proposal for next year includes almost 10,000 observer sea days, and several activities designed to improve onboard observers' work and the overall project performance. Unfortunately, we are unable to achieve it because of the lack of budget. This situation reflects the biological, political and economic crisis in the fishing sector, and a direct consequence of this crisis is the delay in the implementation of a cost-recovery system to fund the fishery research and management. We must also keep in mind, the deep economic crisis that is affecting our country at the moment and the fact as a result of it, the government reduces the budget of the Federal Agencies like the INIDEP.

Our objectives are:

- to get the minimum level activity that lets us obtain enough scientific data to reduce the uncertainty in the assessments.
- to develop all the activities proposed in order to transform the observer program into a reliable reference point for the fishing sector
- to cooperate in the development of an integrated monitoring fisheries system.
- The international recommendations are clear as for the commitment of the governments to minimize the uncertainty and to develop efficient, standardized and cost-effective monitoring system. We are sure that, although we should improve in many aspects, our observer program has a solid base to face this challenge. The central question is whether the authorities considering this crisis context will take the political decision that gives us the opportunity to fulfill the task.

AUSTRALIA

Small-Scale Estuarine Commercial Finfish Fisheries in New South Wales, Australia

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Fishery Description

Gillnet and beach-seine gears form the basis of important regional estuarine commercial fisheries in New South Wales (NSW), Australia. These fisheries, which land around 3,500 tonnes of finfish valued at approximately US$5 million per annum, are part of the larger Estuary General Restricted Fishery, which is managed by the State government. Approximately 750 fishers are endorsed to use gillnets and beach-seines in up to 80 estuaries throughout the state, primarily using small boats < 6m. Both gear types catch a multitude of fish species, with sparids, mugilids, platycephalids, sillaginids and girellids generally dominating landed catches. Despite the importance of these fisheries to many small coastal towns, there is much concern among resource interest groups over discarding in these fisheries—primarily of undersize commercial and recreational species—with many calls to ban these methods of fishing. In response to these growing concerns, observer surveys were initiated to identify and quantify spatial and temporal variability in the retained and discarded catches in these fisheries.

Observer Program Management

The voluntary observer program for each gear type was run over 12 months and was entirely managed by the state government (NSW Fisheries), with funding being provided by the Federal government (via the Fisheries Research and Development Corporation). The program for each fishery cost approx. US$60,000. Sampling was stratified across the several estuaries in different geographic zones and observer coverage accounted for between 4 and 25% of reported fishing effort (days fished) depending on the estuary and gear type. Centrally based fisheries staff did most sampling, with some regional-based observers employed to cover some estuaries. Staff at NSW Fisheries controlled the design, data management and analysis and all publications of the programs.

The program revealed that up to 77% by number and 59% by weight of total beach-seine catches and 33% by number and 20% by weight of total gillnet catches was discarded. The composition of discards varied geographically, among seasons and between gear types. The data from these observer programs are being used to develop alternative fishing gears and practices and to change management arrangements in the fisheries. The data will also provide a baseline for future monitoring and assessments of these fisheries.

CANADA

Canadian Gulf Region Herring

Contact: Ron Manderson, Observer Program Chief, Canada Dept. of Fisheries and Oceans, Moncton, New Brunswick, Canada E1C 9B6, mandersonr@dfo.com.ca; Scientific Coordinator: Claude LeBlanc

Observer Program Mandate and Authority

Mission of the program: To monitor compliance with closed areas, quota, landing requirements, gear restrictions, discarding and reporting requirements. To collect data for stock assessments.

Fishery management: Federal.

Authority to place observers: Section 46 Fishery (General) Regulations.

Voluntary or mandatory: Mandatory.

Funding sources: Federal Govt./Fishing industry.

Annual program costs: $50,000.

Fishery Description

Target species: Herring.

Other commercially landed species: Mackerel.

Fleet size: 6 seiners.

Season of operation: May–December.

Annual catch of target species: 13,600 mt.

Average number of fishing days/year: 1,500.

Observer Program Management

The management of program is federal and the regional manager is responsible for program delivery. A contract for services is tendered for all observer services in the Region. The contractor works in close consultation with the program manager to ensure timely and cost-effective deployments. The contractor, Biorex Inc., is responsible for ensuring sufficient observers are available for deployment. The contractor briefs observers based on input from the program manager and scientific coordinator. Data entry is completed by the contractor.

Observer Coverage

Fraction of fishing activity observed: Herring—5–10%; 150 days.

Canadian Gulf Region Cod

Contact: Ron Manderson, Observer Program Chief, Canada Dept. of Fisheries and Oceans, Moncton, New Brunswick, Canada E1C 9B6, mandersonr@dfo.com.ca; Scientific Coordinator: Ghislain Chouinard

Observer Program Mandate and Authority

Mission of the program: To monitor compliance with closed areas, quota, landing requirements, gear restrictions, discarding and reporting requirements. To collect data for stock assessments.

Fishery management: Federal.

Authority to place observers: Section 46 Fishery (General) Regulations.

Voluntary or mandatory: Mandatory.

Funding sources: Federal Govt./Fishing industry.

Annual program costs: $1,500,000.

Fishery Description

Target species: Cod.

Other commercially landed species: American plaice.

Fleet size: 300.

Season of operation: April–December.

Annual catch of target species: 6,000 mt.

Average number of fishing days/year: 7,000.

Observer Program Management

The management of program is federal and the regional manager is responsible for program delivery. A contract for services is tendered for all observer services in the Region. The contractor works in close consultation with the program manager to ensure timely and cost-effective deployments. The contractor, Biorex Inc., is responsible for ensuring sufficient observers are available for deployment. The contractor briefs observers based on input from the program manager and scientific coordinator. Data entry is completed by the contractor.

Observer Coverage

Fraction of fishing activity observed: Cod–20%; 50 days.

Canadian Gulf Region Snow Crab Area 12

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Observer Program Mandate and Authority

Mission of the program: To monitor compliance with closed areas, quota, landing requirements, gear restrictions, discarding and reporting requirements. To collect data for stock assessments.

Fishery management: Federal.

Authority to place observers: Section 46 Fishery (General) Regulations.

Voluntary or mandatory: Mandatory.

Funding sources: Federal Govt./Fishing industry.

Annual program costs: $600,000.

Fishery Description

Target species: Snow crab.

Fleet size: 330.

Season of operation: April–July.

Annual catch of target species: 24,965 mt

Average number of fishing days/year: 15–30/vessel.

Observer Program Management

The management of program is federal and the regional manager is responsible for program delivery. A contract for services is tendered for all observer services in the Region. The contractor works in close consultation with the program manager to ensure timely and cost-effective deployments. The contractor, Biorex Inc., is responsible for ensuring sufficient observers are available for deployment. The contractor briefs observers based on input from the program manager and scientific coordinator. Data entry is completed by the contractor.

Observer Coverage

Fraction of fishing activity observed: Snow crab—30%; 1,200 days.

Canadian Gulf Region Groundfish Mobile Gear

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Observer Program Mandate and Authority

Mission of the program: To monitor compliance with closed areas, quota, landing requirements, gear restrictions, discarding and reporting requirements. To collect data for stock assessments.

Fishery management: Federal.

Authority to place observers: Section 46 Fishery (General) Regulations.

Voluntary or mandatory: Mandatory.

Funding sources: Federal Govt./Fishing industry.

Annual program costs: $200,000.

Fishery Description

Target species: American plaice.

Other commercially landed species: Cod, flounder.

Fleet size: 400.

Season of operation: April–December.

Annual catch of target species: 9,000 mt.

Average number of fishing days/year: 7,360.

Observer Program Management

The management of program is federal and the regional manager is responsible for program delivery. A contract for services is tendered for all observer services in the Region. The contractor works in close consultation with the program manager to ensure timely and cost-effective deployments. The contractor, Biorex Inc., is responsible for ensuring sufficient observers are available for deployment. The contractor briefs observers based on input from the program manager and scientific coordinator. Data entry is completed by the contractor.

Observer Coverage

Fraction of fishing activity observed: American plaice—20%; 700 days.

Canadian Gulf Region Northern Shrimp

Contact: Ron Manderson, Observer Program Chief, Canada Dept. of Fisheries and Oceans, Moncton, New Brunswick, Canada E1C 9B6, mandersonr@dfo.com.ca; Scientific Coordinator: Louise Savard

Observer Program Mandate and Authority

Mission of the program: To monitor compliance with closed areas, quota, landing requirements, gear restrictions, discarding and reporting requirements. To collect data for stock assessments.

Fishery management: Federal.

Authority to place observers: Section 46 Fishery (General) Regulations.

Voluntary or mandatory: Mandatory.

Funding sources: Federal Govt./Fishing industry.

Annual program costs: $85,000.

Fishery Description

Target species: Northern shrimp.

Other commercially landed species: Turbot.

Fleet size: 1 in this Region; 16 total license holders.

Season of operation: January–December.

Annual catch of target species: 3,000 mt.

Average number of fishing days/year: 260.

Observer Program Management

The management of program is federal and the regional manager is responsible for program delivery. A contract for services is tendered for all observer services in the Region. The contractor works in close consultation with the program manager to ensure timely and cost-effective deployments. The contractor, Biorex Inc., is responsible for ensuring sufficient observers are available for deployment. The contractor briefs observers based on input from the program manager and scientific coordinator. Data entry is completed by the contractor.

Observer Coverage

Fraction of fishing activity observed: Northern shrimp—100%; 260 days.

Scotia–Fundy Fisheries—Maritimes Region

Contact: Hugh Parker, Observer Coordinator, Canada Dept. of Fisheries and Oceans, Maritime Region, parkerh@mar.dfo-mpo.gc.ca; Scientific Coordinator: Mark Showell, showellm@mar.dfo-mpo.gc.ca; Technician: Greg Croft, croftg@mar.dfo-mpo.gc.ca

Observer Program Mandate and Authority

Mission of the program: To monitor fisheries legislation and collect scientific data.

Fishery management: Federal.

Authority to place observers: Section 46, Fishery (General) Regulations.

Voluntary or mandatory: Mandatory.

Funding source(s): Industry/Government.

Program duration: One year contract with two 24 month option periods.

Total program costs: Administration and operating costs ~$1.9 million (Cdn).

Observer Program Management

The project authority for the Department of Fisheries and Oceans' (DFO) Observer Program is the Federal Government with the day-to-day operation the responsibility of the regional the DFO Observer Coordinator who reports to the Director of the Conservation and Protection Branch. The scientific authority is responsible for the data collection protocol and storage of the biological data. The observer contractor, GTA/JAVITECH Ltd, is responsible for providing observers, none of whom are unionised. The retention rate for the observer core is very high. Industry pays most of the operating costs while the government pays the program administration fees.

In the Maritimes Region there are ~3,800 observer sea days annually. Observer coverage levels are determined regionally by consultation among the following DFO Branches: Conservation & Protection, Resource Management, and Science and with fishers through fishery advisory committees. Coverage levels are determined a number of ways—i.e., a percentage of quota, a prescribed number of sea days or trips, or a portion of the number of fleet sea days, etc. The level of observer coverage also varies according to the fishery, the fleet type, the size of vessel, etc.

The definition of an "observer day" (sea day) is any day or portion of a day comprising a minimum of six (6) hours, that an observer is carrying out assigned duties, including work on board fishing vessels at sea, attending court, preparing reports and performing other land based assignments at the request of the Project Authority.

The number of violations or irregularities varies from year to year. Common irregularities include illegally setting gear, improper sorting and storing of catch, fishing in an unlicensed area, discarding fish and improper gear usage. In 2001 ~17 different irregularities were reported to fishery officers for further investigation.

Fisheries Descriptions

Groundfish (Fixed Gear)

Target species: Groundfish—cod, pollock, haddock, white hake, halibut, etc.

Bycatch: Landed—cusk; discarded—skate, dogfish, sculpin, etc.

Gear: Bottom longline using baited hooks and some anchored gillnets.

Fleet size: 2,600 licensed, 790 active boats.

Vessel size: Most <45', some 45'–65', and a few >100'.

Season of operation: January–December; peak: May–October.

Area: NAFO—4VWX & 5, with some fishing in 3 MNOP.

Catch of target species: 29,441 t (cod 7,918 t, pollock 6,238 t, haddock 15,285 t).

Annual days on ground: ~13,718, comprised of 12,460 for <45', 724 for 45'–65', 466 for 65'–99' and 68 for >100'.

Deployment duration: 3–5 days average.

Observer coverage (2001 calendar year): The target coverage levels for the fixed gear vessel groups of <45', 45–65', 65'–99' and >100' are based on management directives.

Groundfish (Mobile Gear)

Target species: Groundfish (cod, pollock, haddock, redfish, flounders etc.).

Bycatch: Landed—white hake, cusk; discarded—skate, dogfish, sharks and benthic invertebrates.

Gear: Bottom otter trawl towed from the stern with regulated mesh type and size.

Fleet size: 431 licensed, 198 active daggers.

Vessel size: 40'–150', average 45'–65'.

Season of operation: January–December; peak: May–October.

Area: NAFO—4VWX & .5.

Catch of target species: Cod 3,172 t, pollock 3,851 t, haddock 11,320 t, redfish 8,075 t, and flounder 4,593 t.

Annual days on ground: ~12,374.

Deployment duration: 1–5 days <65' vessels, 3–7 days 65'–100', and 5–10 days >100'.

Observer coverage (2001 calendar year): The target coverage levels ranged from 5 to 10% for the mobile gear vessel groups of <65', 65–99' and >100' and are based on management directives.

Domestic and Developmental Silver Hake

Target species: Silver hake.

Bycatch: Landed—red/white hake, herring, squid; discarded—dogfish, skate.

Gear: Bottom otter trawl with minimum mesh size and separator grate.

Fleet size: ~26 small draggers and 1–3 trawlers and 1 foreign factory freezer trawler.

Vessel size: Most <65', 1–3 >100', 1 >200'.

Season of operation: January–December; peak: May–August.

Area: Small draggers fished the Scotian Shelf Basins and the Silver Hake Box, both in 4WX, while the foreign trawler fished only in the Silver Hake Box.

Catch of target species: MG <65' 11,074 t, MG >100' 1,330 t, and developmental 1,925 t.

Annual days on ground: MG<65' ~600, foreign vessel ~100.

Deployment duration: Domestic vessels 1–3 days, foreign vessels 30–45 days.

Observer coverage (2001 calendar year): The target coverage levels for small domestic draggers was ~10%. Foreign vessels had 100%.

Test Fishery (Groundfish)

Target species: Groundfish (cod, haddock, pollock, silver hake).

Bycatch: Landed—redfish, white hake, cusk; discarded: skate, dogfish.

Gear: Fixed-gear bottom longlines and mobile-gear bottom otter trawls.

Fleet size: Not applicable.

Vessel size: Varies 44 to >100'.

Season of operation: January–December.

Area: NAFO—4VWX & 5.

Catch of target species: Variable.

Annual days on ground: 20–200.

Deployment duration: 1–5 days.

Observer coverage (2001 calendar year): All test fisheries on fixed gear vessels <45' and silver hake draggers required 100% observer coverage.

Large Pelagic—Bluefin Tuna

Target species: Bluefin tuna.

Bycatch: Landed—bigeye tuna, yellowfin tuna, albacore; discarded—shark.

Gear: 4 baited tended lines, stationary or trolling via rods.

Fleet size: ~40 vessels.

Vessel size: 36'–65', average ~44'.

Season of operation: June–December; peak: July–October.

Area: NAFO—4VWX & 5.

Catch of target species: 314 t.

Annual days on ground: ~1,253.

Deployment duration: 1-5 days.

Observer coverage (2001 calendar year): The target coverage levels were ~5% based on management directives.

Large Pelagic—Swordfish & Other Tunas

Target species: Swordfish and other tunas: bigeye, yellowfin and albacore.

Bycatch: Landed—dolphinfish, mako shark, marlin; discarded: rays, shark, turtles.

Fleet size: ~52 pelagic longliners.

Gear: Drift longline.

Vessel size: 64'–120'.

Season of operation: January–December; peak: May–October.

Area: NAFO—3MNO, 4VWX, 5 and 6.

Catch of the target species: Swordfish: 778 t; other tunas: 309 t, marlin 3 t, dolphinfish 28 t.

Annual days on ground: ~2,929.

Deployment duration: 4–17 days.

Observer coverage (2001 calendar year): The target coverage levels for the regular swordfish fishery, regular other tuna fishery, fall other tuna fishery and the offshore tuna fishery ranged from 5 to 100% based on management directives.

Small Pelagic—Herring

Target species: Herring.

Bycatch: Landed—mackerel, gaspereau; discarded—dogfish, groundfish.

Gear: Purse seine with minimum mesh size restriction.

Fleet size: 28 seiners.

Vessel size: 65–120'.

Season of operation: October–September; peak: August–October.

Area: NAFO—4VWX & 5.

Catch of the target species: 78,132 t.

Annual days on ground: ~1,517.

Deployment duration: 1–3 days.

Observer coverage (2001 calendar year): The target coverage levels ranged from 5 to 100% based on management directives.

Snow Crab

Target species: Snow crab.

Bycatch: Landed—none; discarded—lobster, other crab.

Gear: Rectangular or conical pots with escape mechanism

Fleet size: ~150 trap vessels.

Vessel size: 36'–45'.

Season of operation: July–September.

Area: NAFO—4VWX.

Catch of target species: 10,400 t.

Annual days on ground: ~4,494.

Deployment duration: 1–4 days.

Observer coverage (2001 calendar year): The target coverage levels ranged from 5 to 10% depending on area.

Offshore Lobster

Target species: Lobster.

Bycatch: Landed—none; discarded—Jonah crab, other crab, a few groundfish.

Gear: Wood or metal wire traps with escape mechanism.

Fleet size: 7 trap vessels.

Vessel size: Average 99'.

Season of operation: October–September; peak: October–December, April–June.

Area: NAFO—4VWX & 5.

Catch of target species: 797 t.

Annual days on ground: ~575.

Deployment duration: 3–5 days.

Observer coverage (2001 calendar year): The target coverage level based on management directives.

Northern Shrimp

Target species: *Pandalus borealis, Pandalus Montagui*.

Bycatch: Landed—none; discarded—redfish, cod, flounder, etc.

Gear: Mobile gear, bottom otter trawl with separator grate.

Fleet size: 4 trawlers.

Vessel size: 175'+.

Season of operation: January–December.

Area: NAFO—0A, 0B, 2GHJ and 3K.

Catch of target species: 28,309 t.

Annual days on ground: ~700.

Deployment duration: Average 27 days.

Observer coverage (2001 calendar year): 100% observer coverage.

Inshore Scallops

Target species: Scallops.

Bycatch: Landed—monkfish; discarded—cod, haddock, crab, lobster.

Gear: Multiple bag rakes towed on bottom with ring mesh size regulated.

Fleet size: ~167 active draggers.

Vessel size: 40'–65'.

Season of operation: January–December; peak: January–September.

Area: NAFO—4VWX.

Catch of target species: 85,706 t.

Annual days on ground: ~13,000.

Deployment duration: 1 day.

Observer coverage (2001 calendar year): The target coverage level based on management directives.

Exploratory Longhorn Sculpin

Target species: Longhorn sculpin.

Bycatch: Landed—winter flounder, cod, haddock; discarded—lobster, crab.

Gear: Bottom otter trawl with 130mm square mesh codend.

Fleet size: 4 draggers.

Vessel size: 36"–40'.

Season of operation: April–May.

Area: St. Mary's Bay, NAFO—4X.

Catch of target species: 64 t.

Annual days on ground: ~30–120.

Deployment duration: 1 day.

Observer coverage (2001 calendar year): The target coverage level for longhorn sculpin was 100% based on management directives.

Note: There were a number of other fish surveys in 2001—i.e., 5Z fixed gear <45', monkfish, shrimp and inshore scallop with target levels based on management directives. As well, the offshore scallop industry deployed at-sea observers to their offshore scallop fleet in order to conduct a special survey. This deployment was outside of the normal observer program coverage—i.e., did not follow standard protocol.

Exploratory Crab

Target species: Red crab, Jonah crab, rock crab.

Bycatch: Landed—toad crab; discarded—lobster, snow crab, groundfish.

Gear: Rectangular or conical pots with escape mechanism.

Fleet size: ~62 trap vessels.

Vessel size: 44'–65'.

Season of operation: January–December; peak: June–October.

Area: NAFO–4VWX & 5.

Catch of target species: Red crab 42 t, Jonah crab 1,004 t.

Annual days on ground: ~992.

Deployment duration: 2 days.

Observer coverage (2001 calendar year): The target coverage levels based on management directives.

Industry Surveys

Target species: Halibut, skate, groundfish.

Bycatch: Landed—cod, haddock, white hake, cusk; discarded—skate, dogfish.

Gear: Anchored bottom longline with baited hooks or bottom otter trawl.

Fleet size: Halibut Survey—12 longliners, Skate Survey—4 draggers, and Sentinel Survey—15 longliners.

Vessel size: 34'–65'.

Season of operation: Halibut Survey, January–December; Skate Survey January–December; Sentinel Survey, July–October.

Area: NAFO—4VWX.

Annual days on ground: Halibut Survey ~276, Skate Survey ~19–3, Sentinel Survey ~50.

Deployment duration: Halibut Survey ~8 days, Skate Survey 4–8 days, Sentinel Survey 1–6 days.

Observer coverage (2001 calendar year): The target coverage level in all surveys was based on management directives.

Canada Pacific Region (British Columbia): Groundfish/Shrimp Fishery by Trawl, Hook & Line and/or Trap Gear

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Observer Program Mandate and Authority

Mission: To monitor compliance, collect biological samples/information and provide an accurate accounting of total catch and activities of fishing vessels off the west coast of Canada for science and management purposes (i.e., stock assessment, Individual Vessel Quota Programs).

Fishery management: Management for all groundfish fisheries occurring within the Pacific Region is the responsibility of the Federal government of Canada and mandated to the department known as Fisheries and Oceans Canada (DFO).

Authority to place observers: Section 46 of Fishery (General) Regulations.

Funding source: Co-funded by Industry (~65%) and DFO (~35%).

Annual program cost: $2,900,000 (CDN).

2002 Groundfish Observer Program Coverage Levels, Pacific Region, Canada

Fishery	Fishing Gear	2002 Coverage Targets (%)	2002 Anticipated Sea Days
IVQ Groundfish Trawl	Bottom/midwater trawl	100	5,800
IVQ Hake Trawl	Midwater trawl	10	100
Inshore Groundfish Trawl	Bottom trawl	10	100
Shrimp Trawl	Bottom trawl	<1	50
IVQ Halibut	Hook and line	15	1,075
Inshore Rockfish IVQ Sablefish	Hook and line Hook and line/trap	10 10	235 100
Groundfish other	Hook and line	10	205
Total			**7,665**

Observer Program Management (General)

DFO staff outlines the specific objectives of the observer program for each specific fishery. This includes but is not limited to establishing catch monitoring, effort and biological data collection requirements as well as compliance monitoring objectives. A single company, Archipelago Marine Research Ltd., 2nd Floor, 525 Head St, Victoria, British Columbia, Canada, V9A 5S1, (250) 383-4535, amr@archipelago.ca, is under contract to DFO to supply observer services. Observers are employees of that contractor. Observer recruitment and training is the responsibility of the contractor while official designation of at sea observers is a DFO responsibility. Deployment and pre trip briefing of observers for all fisheries and assignments is the responsibility of the contractor. All observers are trained for and deployed on assignments in all fisheries within the program. Observer staffing levels fluctuate between 50 and 80 observers in order to meet coverage needs for all observed fisheries throughout the year. Deployment of observers is coordinated centrally while actual assignments originate from 5 designated coastal ports.

Each observer assignment produces a data package, which is entered and edited centrally by contractor. Quality assurance is ensured through trip by trip editing and a multi-layered debriefing process. Larger scale batch editing is also conducted as a secondary quality control measure before final data is provided to the user groups. The timelines associated with the provision of data to the users vary by fishery and the nature of the information being provided. Post trip debriefings are the responsibility of the contractor.

Fisheries Observed

Offshore Groundfish Trawl Fishery

Mandatory 100% observer coverage for bottom/midwater trawl fishing that targets both shelf and slope groundfish. Targeted species include rockfish, flatfish, gadids, other roundfish and a number of elasmobranchs. The primary objective is to provide data needed to employ the Individual Vessel Quota (IVQ) management system that allocates 29 species over 55 management area groups. Other objectives include the collection of scientific catch and biological data, monitoring catch levels of unwanted species, monitoring the capture of species prohibited within the fishery and monitor compliance. The cost of the trawl observer program is shared between industry and government. There are approximately 70 active participants in this fishery. Vessel size ranges from 15 to 40 meters. Vessels in this fleet operate year round with activity levels influenced by market demands and weather. There are approximately 5,800 observed fishing days per year for these vessels with annual landings of approximately 40,000 tonnes.

Offshore Hake Trawl Fishery

Approximately 10% observer coverage for mid-water trawl fishing for Pacific hake. Biological samples and fisheries data collected is used to monitor bycatch levels and estimate catch and effort. Government and industry share the cost of this program. The total allowable catch of pacific hake for this fishery in 2002 was approximately 50,000 tonnes. This fishery operates between May and October of each year. Participating vessel range in size from 15 to 40 meters.

Inshore Groundfish Trawl Fishery

Partial coverage of the inshore groundfish trawl fishery. This fishery targets a number of flatfish, elasmobranchs, cottids and other roundfish. The objective is to monitor catch for targeted, non-targeted and prohibited catch species and gather detailed catch and effort data. The cost of this program is borne by the government. This is a relatively small fishery with approximately 350 tonnes of targeted catch landed annually. Vessels are typically smaller in size and range from seven to 18 meters.

Shrimp Trawl Fishery

Partial coverage of the shrimp trawl fishery in offshore and inshore waters. Approximately 100 observed days per year are used to monitor catch and effort by area of the seven pandalid shrimp species targeted within this fishery. Observer data is used in the monitoring the level of finfish bycatch and vessel compliance. Biological samples are collected to compliment catch and effort data. The cost of this program is borne by the government. This is a year round fishery with area specific quotas which result in different fishing areas being open at different times of the year, each for a different duration. Annual landing are approximately 3,000 tonnes. There are currently 248 vessels, which are eligible for this fishery. Active vessels range in size from seven to 18 meters.

Longline Halibut Fishery

The at-sea observer coverage target is approximately 15% of fishing days. Industry participants use longline or troll gear. There are approximately 265 active vessels in this fishery with recent yearly landings around 5,500 tonnes. Vessel size ranges from five to 25 meters. Fishing activity in this fishery occurs from mid March to mid November of each year. The observer program is co-funded by industry and government. Monitoring bycatch levels, particularly inshore rockfish, documenting possible interactions with seabirds and compliance are the main objectives of this program.

Longline Rockfish Fishery

This fishery is composed of 5 sectors licenced to fish shelf and slope rockfish (includes inshore rockfish) using longline gear. Observer coverage currently targets approximately 285 fishing days per year. These days are distributed amongst the following four sectors: (i) a "live" fishery that targets 4 species of inshore rockfish, (ii) vessels targeting yelloweye rockfish (iii) vessels targeting slope rockfish in offshore waters, and (iv) vessels targeting live rockfish or yelloweye rockfish in inside waters. The fifth industry sector is a combination fishery with the longline halibut fishery. There are approximately 168 vessels participating in this fishery with annual landings of roughly 1,500 tonnes. Vessel sizes for this fishery range from small skiffs to 20 meters. This fishery operates from mid May to April of the next year while weather, market demands and area-by-area openings and closures drive activity. The main objective of the observer presence is to monitor bycatch levels, documenting possible interactions with seabirds and monitor compliance. The observer program for this fishery is co-funded by industry and Government.

Sablefish Fishery

Approximately 150 days of observer coverage are required each year for the sablefish fishery. Industry participants typically fish between 2-4,000 tonnes of sablefish in the Pacific Region of Canada each year. There are currently 48 vessels eligible for this fishery, while about 27 participate each year. Active vessels in this fishery range in size from five to 39 meters. Smaller vessels typically employ longline gear while larger vessels use longline traps. The observer program is used to monitor the bycatch of incidental groundfish and invertebrates, to provide catch and effort and biological data, documenting possible interactions with seabirds and monitor compliance. The observer program for this fishery is co-funded by industry and F&O Canada.

Longline Groundfish (Other Species) Fishery

Limited partial observer coverage is provided for longline vessels targeting dogfish and or lingcod. Over 5,000 licensed vessels are able to capture dogfish with longline gear or lingcod using handline gear. Active participants include roughly 40 vessels landing 7,500 tonnes of dogfish and about 70 vessels landing 700 tonnes of lingcod each year in this fishery. This fishery operates from mid May to April of the next year while weather, market demands and area by area openings and closures drive activity. The observer program has a target of about 200 days of coverage and is co-funded by industry and government. Vessel size ranges from small skiffs to 15 meters. Observer data is primarily used to monitor bycatch levels, documenting possible interactions with seabirds and compliance.

EASTERN PACIFIC OCEAN

Tuna Purse Seine Fishery in the Eastern Pacific Ocean (EPO)

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Observer Program Mandate and Authority

Mission: The IATTC's responsibilities were broadened in 1976 to address the problems arising from the incidental mortality in purse seines of dolphins that associate with yellowfin tuna in the EPO. The principal responsibilities of the IATTC's Tuna-Dolphin Program are (1) to monitor the abundance of dolphins and their mortality incidental to purse-seine fishing in the EPO, (2) to study the causes of mortality of dolphins during fishing operations and promote the use of fishing techniques and equipment that minimize these mortalities, (3) to study the effects of different modes of fishing on the various fish and other animals of the pelagic ecosystem, and (4) to provide a secretariat for the International Dolphin Conservation Program, described below. The Agreement for the Conservation of Dolphins ("the 1992 La Jolla Agreement") provided a framework for the international efforts to reduce the mortality of dolphins incidental to purse-seine fishing for tunas, and introduced such novel and effective measures as Dolphin Mortality Limits (DMLs) for individual vessels, and the International Review Panel (IRP) to monitor the performance and compliance of the fishing fleet. A binding agreement, the Agreement on the International Dolphin Conservation Program (AIDCP), which built on and formalized the provisions of the 1992 La Jolla Agreement, entered into force in February 1999. The Parties to this agreement are committed to "ensure the sustainability of tuna stocks in the eastern Pacific Ocean and to progressively reduce the incidental dolphin mortalities in the tuna fishery of the eastern Pacific Ocean to levels approaching zero; to avoid, reduce and minimize the incidental catch and the discard of juvenile tunas and the incidental catch of non-target species, taking into consideration the interrelationship among species in the ecosystem." Currently, the Parties to this agreement are Bolivia, Colombia, Costa Rica, Ecuador, the European Union, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, the United States, Vanuatu, and Venezuela. The AIDCP includes the On-Board Observer Program, which is the combined observer programs of the IATTC, Ecuador, Mexico, and Venezuela.

Fishery management: The IATTC scientific staff recommends appropriate conservation measures so that the stocks of fish can be maintained at levels that will afford maximum sustainable catches. These measures are implemented by IATTC resolutions and enforced through national regulations. Provisions of the AIDCP are binding for all Parties.

Funding source(s): The IATTC budget includes a component to pay no more than 30% of the costs associated with the On-Board Observer Program for vessels of Parties that are also IATTC member states. Yearly assessments of vessels that are required under the provisions of the AIDCP to carry observers (> 363 mt carrying capacity) cover the remainder of the costs. The assessments are based on vessels' fish-well volumes in cubic meters.

Annual program costs: Approximately US $2,000,000 (direct and indirect program costs).

Fishery Description

The fishery is aimed mainly at three tuna species: yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obsesus*), skipjack tuna (*Katsuwonus pelamis*), and less importantly, the Pacific bluefin tuna (*T. orientalis*). The bycatch includes commercially important species such as billfishes and mahi-mahi, but their volume is minimal, except in a mode of fishing in which fish aggregating devices (FADs) are used to concentrate tuna near the surface.

The fishing fleet consists mainly of vessels of three gear types: purse seiners, baitboats, and longliners. Purse seine vessels contribute to over 80% of the catch.

The area of application of the AIDCP is the area of the Pacific Ocean bounded by the coastline of North, Central, and South America and by the following lines:

- The 40ºN parallel from the coast of North America to its intersection with the 150ºW meridian;
- The 150ºW meridian to its intersection with the 40ºS parallel;
- And the 40ºS parallel to its intersection with the coast of South America.

More than 220 purse seiners with carrying capacities ranging from 100 to 2,800 MT operate year-round in the surface fishery (close to 180,000 MT of carrying capacity) of the EPO. The IATTC's international observer program currently samples approximately 146 of them (close to 160,000 MT of carrying capacity). Of the nearly 700 trips sampled per year by the On-Board Observer Program, about 500 are sampled by the IATTC program. Observed trips have an average duration of approximately 45 days.

Observer Program Management

The IATTC staff manages its international observer program. The national observer programs are each managed by their respective staffs. The logistical aspects of the IATTC program and the initial review of observer field data are done by regional field office staffs in Ecuador, Mexico, Panama, and Venezuela. The recruiting and hiring of observers are done by the regional offices with the input of personnel at IATTC headquarters in La Jolla, California, USA. Training is organized by the field offices and conducted by La Jolla-based staff with the assistance of field office staff. When an observer returns from his trip assignment, field office employees conduct a two to four-day debriefing. The data is then express-mailed to headquarters for final editing and database entry. The scientific personnel also maintain and manage the database. All La Jolla-based data editing personnel are experienced former observers.

Observer retention: Observer retention is variable and greatly depends on the economic conditions and job opportunities that field biologists have in their respective countries. In some countries, IATTC observers have remained in the program for over 15 years, while in others there is a much higher turnover rate. Currently, the IATTC employs about 120 observers of 6 different nationalities on a trip-to-trip basis.

Number of violations issued annually based on observer data: Not available.

NAMIBIA

Namibian Observer Programme: Emphasis on the Hake Fishery

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Observer Program Mandate and Authority

Goal and objectives of the program (mission): The overarching goal of the Observer Program is to contribute to the conservation and optimal sustainable utilization of Namibia's biological resources.

The objectives of the Observer Program shall be to:

- Undertake independent observations of the harvesting of marine resources in Namibian waters to provide catch, bycatch, and biological data necessary to support in season monitoring and stock assessment as required by the Ministry of Fisheries and Marine Resources (MFMR).
- Complement the MFMR monitoring, control, surveillance and scientific activities through the provision of prompt and accurate information.
- Provide information necessary to support management of marine mammals and other protected species.
- Provide information necessary to support other specific science and management programs.

The Namibian Fishery Observer program is managed by a juristic person known as the Fisheries Observer Agency (FOA) established under the Marine Resources Act of 2000 to perform specific tasks for the benefit of the MFMR. A management board consisting of six persons appointed by the Minister is the governing body of the agency and has the authority to exercise and perform the functions conferred to the agency under the Marine Resources Act. Since the establishment of the MFMR after Independence in 1991, the fisheries observers were employed on full time and contractual basis, but without any benefits other than a sea rate salary of N$11.25 per 12 hours duty paid by the fishing industry. The MFMR revised this employment method in 1998 and decided on the establishment of the FOA to provide full time employment to the observers with all the necessary benefits. This process took up to two years since the old Fisheries Act needed to be amended and the FOA officially started operating as a private entity on May 01, 2002.

Authority to place observers: The Minister has the right to require a person harvesting marine resources under a commercial right, an exploratory right or a fishing agreement to carry a fisheries observer onboard any fishing vessel. He has delegated the FOA as the authorized body to place observers on all commercial fishing vessels licensed to operate in the Namibia exclusive economic zone (EEZ). It is mandatory for fishing vessels to request for fisheries observers for every sea trip. They should provide the observer with food and reasonable accommodation, allow the observer access to all parts of the vessel, records, documents and marine resources harvested and the use of all equipment necessary for the performance of his or her functions.

Funding sources: The Ministry of Fisheries and Marine Resources, Norwegian Agency for Development Co-operation (NORAD) with mostly training assistance. The fishing industry pays for the observer salaries.

Annual Program Costs

	Total Costs (N$)
Summary Observer Salary Costs	7,827,850
Summary of FOA Running Costs	3,539,922
Summary of FOA Set-up Costs	2,401,845
Annual Program Costs	**13,048,132**

The data collected by Fishery Observers' aids to a better understanding of the biology of the species as well as a better understanding of the various commercial fisheries. This report summarises data collected by onboard fisheries observers through the Observer Program from 1997–2001 onboard hake vessels.

Description of the Hake Fishery

Target species: The bulk of the Namibian bottom trawl fishery consists of the 2 species of hake, *Merluccius capensis* and *Merluccius paradoxus*. These two species of hake occur on the shelf and upper slope in the Namibian waters. *M. capensis* occur at depths from about 100 m to 350 m and overlaps with the shallow end of the distribution range of *M. paradoxus*, which occur mainly at depths of 300 m up to 500 m and even deeper, having been found at depths exceeding 900 m. A depth-related size distribution, with the smaller fish of both species occurring shallower than the larger fish has been recorded.

Other commercially landed species caught with bottom trawls that are of significant economic importance because they command high prices include: Monkfish (Angler fish) (*Lophius vomerinus*), Kingklip (*Genypterus capensis*) and Sole (*Austoglossus microlepsis*).

Several other species: Several other species form a small bycatch of the hake trawl fishery, notably grenadiers, skates, and deep-sea shark species.

Vessels used: Freezers: 30 vessels, Wet fish: 89 vessels, Long-liners: 17 vessels. Both Freezer and Wet fish vessels used bottom trawl gear with a codend mesh size of 110 mm whereas the long-liners used bottom long lines with up to 2,000 hooks per line baited with sardine and squid. Vessel range in size from about 107.21 up to 3,179.75 gross tonnage. Fishing for hake is carried out by licensed vessels within the Namibian EEZ. Vessels are restricted by law not to fish shallower than the 200m isobath. The hake-fishing season is year-round with an average number of 300 days per year. The annual catch of hake is controlled by the set Total Allowable Catch (TAC). The TAC is set annually on the basis of the most recent scientific data available on the size and structure of the stock. Table 1 shows the landings and TACs for the period 1996 to 2001.

Table 1: TACs and Landing Figures for 1996 to 2001 for Hake (metric tons)

	1996	1997	1998	1999	2000	2001
TAC	170,000	120,000	165,000	210,000	194,000	200,000
Landings	135,993	117,583	150,695	164,250	172,389	141,380

Observer Coverage

Sampling performance: The numbers of hake sampled during the five-year period ranged between 246,900 and 507,200 (Table 2).

Table 2: Summary of Hake Fishery Observer Data Collected from 1997 to 2001

	1997	1998	1999	2000	2001
Catch (t)	117,583	150,695	164,250	172,389	141,380
Total catch sampled (t)	7,291	13,141	11,881	8,536	7,625
No. of trips	209	406	400	253	245
No. of samples	1,590	2,439	2,537	2,037	1,722
No. of fish sampled	264,002	507,201	454,021	246,901	258,680
Percent (%) coverage*	6	9	7	5	5

*% Coverage: Percent contribution of the sampled vessels relative to the total landings of the fleet.

The spatial distribution of observer activity for the period 1997 to 2001 is displayed in the following series of maps.

Distribution of Sampling Stations

From the sampling distribution, it is evident that the observers over sample the southern area (26°S–29°S). The proportion of samples per latitude is shown in Figure 1. A possible explanation is that the majority of the Wet fish vessels are too small to carry any observers and these vessels usually operate close to area 21°S–24°S and Walvis Bay (~23°S). Larger wet and freezer vessels that carry observers operate further from Walvis Bay (harbour), and therefore prefer to go south as fishing is generally better than north of Walvis Bay.

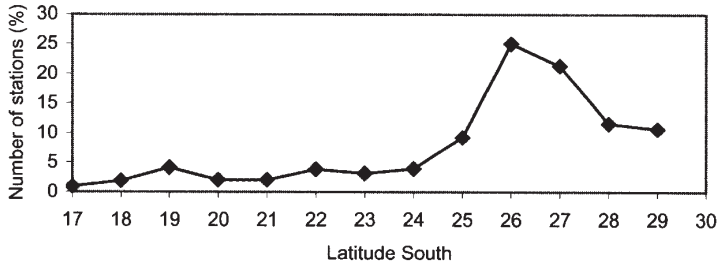


Figure 1: Percent of sampled trawls for the hake fishery.

Species composition: The proportion of hake caught per degree latitude in the sampled commercial catches for 1997–2001 is shown in Figure 2. The 25°S area can be seen as the transition area for the two hake species. South of 25°S deep-water hake is the dominant species in the catches whilst north of 25°S, Cape hake is the dominant species.

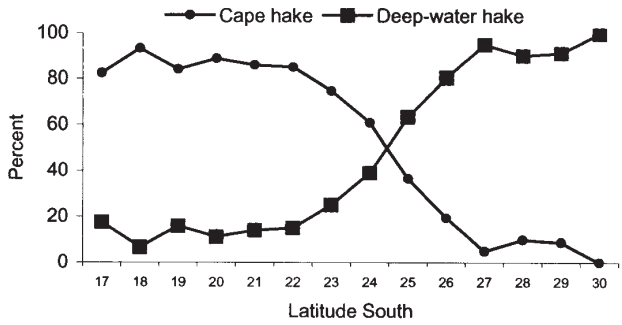


Figure 2: Proportion of hake per degree latitude in the commercial catches between 1997 – 2001.

During this five-year period, deep-water hake on average made up 60% in weight of the total hake catches. The mean length for Cape hake and deep-water hake was 49 cm and 42 cm, respectively. The data further show an increase in the percentage of deep-water hake landings comprised of fish less than 36 cm in length (Table 3). This information may be incorporated in a future management strategy, especially when deciding whether the fishery needs to be more size selective e.g. by using selection grids or by closing areas with a high percentage of small fish present in the catches.

Table 3: Proportion of Cape and Deep-Water Hake Less Than 36 cm (% of total landings of each species, respectively)

	Weight				
	1997	1998	1999	2000	2001
Cape hake	3	2	2	3	3
Deep-water hake	8	3	10	8	15

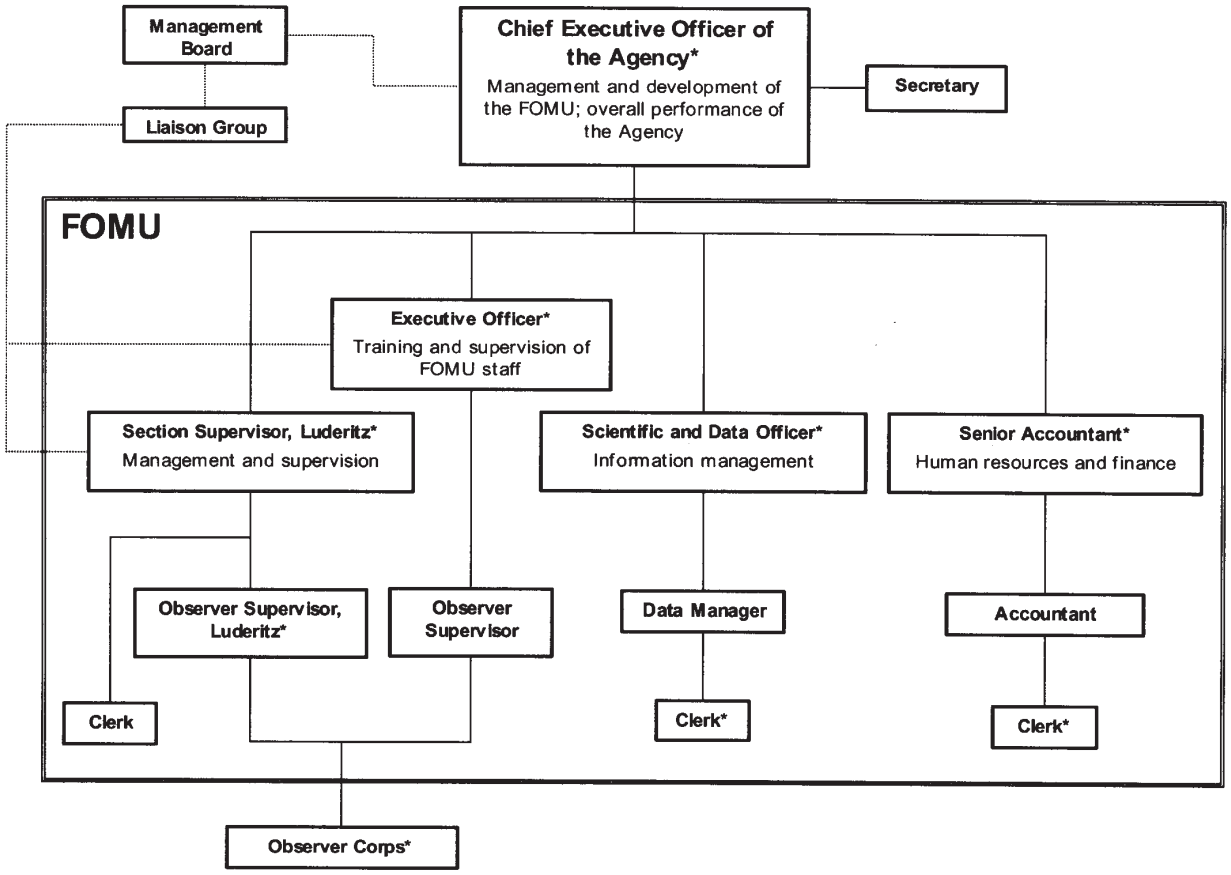
Size structure of commercial catches: Catches by defined strata (month, depth zones and area) were extrapolated to estimate the landings by size of the whole fleet (Table 4). The overall structure of the catch by size was reconstructed by first weighting the numbers at size by each stratum to the catch, and then by summing the numbers at size for all strata.

Table 4: Defined Raising Strata

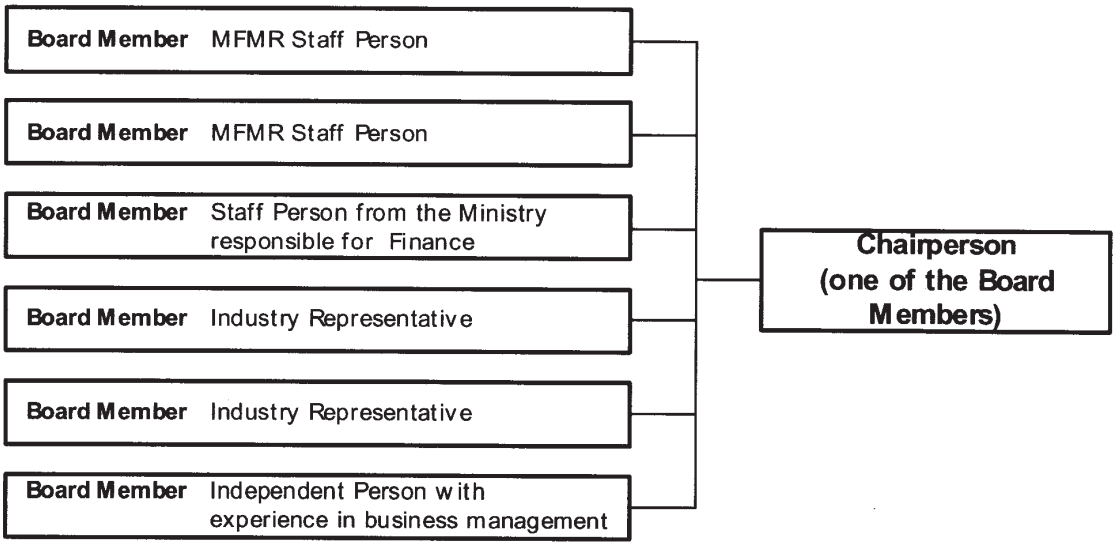
Degree South	Depth Zones (gear depth)	Months
>=17° and <21°	<250, >=250 and <350, >=350	Queries is run for every quarter (Jan.–March; Apr.–June; July–Sept.; Oct.–Dec.)
>=21° and <25°	<250, >=250 and <350, >=350	
>=25° and <27°	<300, >=300 and <400, >=400	
>= 27°	<300, >=300 and <400, >=400	

Observer Program Management

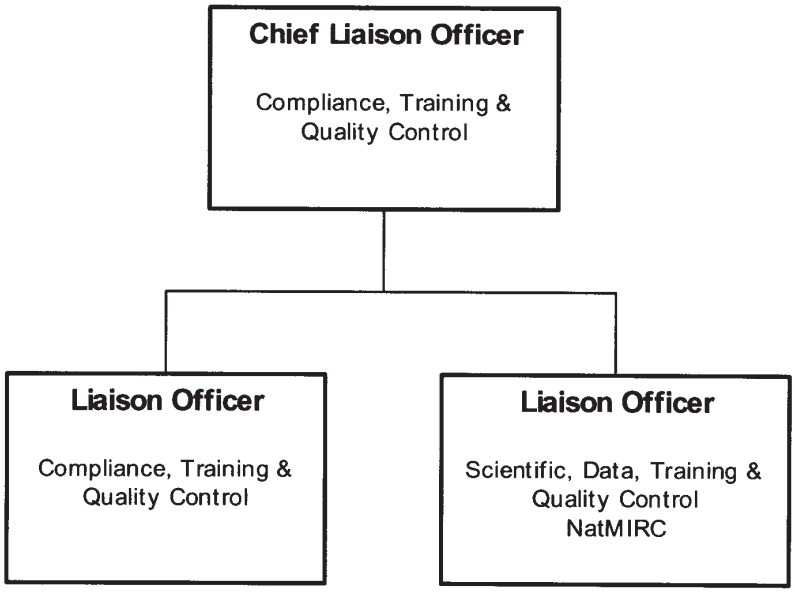
Program structure: The staffing structure (organogram) of the FOA is illustrated below, showing links to the Management Board, the Liaison Group and the Observer Corps.



The Management Board



The Ministry Liaison Group



The Observer Corps

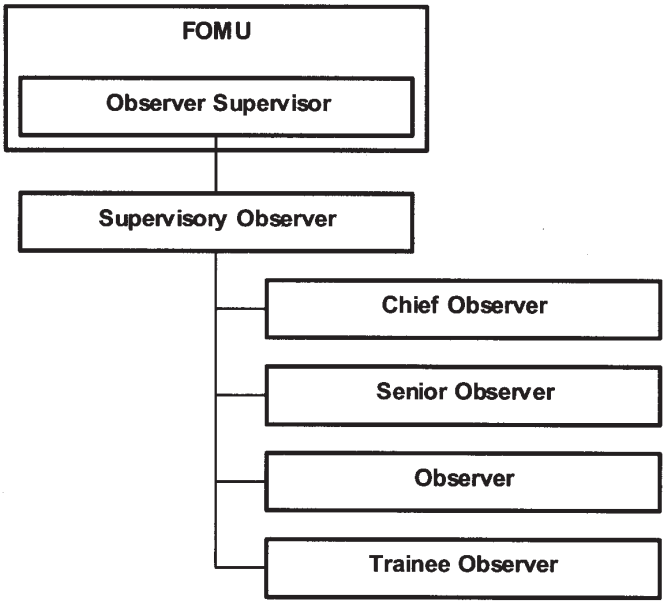
The total number of observers employed by the Agency and supervised by the FOMU will depend on the level of fishing activity, and hence the demand for observers. It is anticipated that the Agency will employ approximately 200 observers who shall be known collectively as the Observer Corps.

The levels of employment within the corps of fisheries observers shall be:

- Supervisory Observer,
- Chief Observer,
- Senior Observer,
- Observer, and
- Trainee Observer.

The position of Supervisory Observer is distinct from the two Observer Supervisors employed within the FOMU. There shall be approximately eight positions of Supervisory Observers created within the Observer Corps.

Supervisory Observers and Chief Observers shall be drawn from those observers who have attained Grade 3 in the observer training system. Senior Observers shall be drawn from those observers who have attained Grade 2 in the observer training system.



Number of observers: The number of observers employed by MFMR and now the FOA has basically stay constant at 200 over the last 3 years of which 34 are females. The average age of the observers is between 23 and 30 years of age. 80% have an education level of grade 12.

Average deployment length: Tables 5 and 6 present a summarisation of all fishery types that carry onboard observers; the deployment length, percent coverage and the average day an observer spend at sea per month.

Table 5

Fishery	Deployment Length	Observer Coverage (%)
Small pelagic	1–7 days	50
Demersal Trawlers—Freezer	40 – 60 days	100
Demersal Trawlers—Wet	4 –18 days	65–75
Longliners	4–18 days	50
Midwater Trawlers	15–35 days	100
Deep-Sea Trawlers	30–45 days	80
Large pelagic	30–60 days	30
Crab	30–60 days	100
Rock lobster	15–25 days	90

Table 6: Average Sea Days Per Observer

Year	Days per Month
1999	20
2000	18
2001	19

Average observer retention rate: The average observer retention rate is 95% per year. Most of the observers leaving, are applying for employment at the MFMR as fisheries inspectors or technical assistants.

Observers unionized: Since the establishment of the Fishery Observer Agency, 126 of the observers affiliated themselves with the Namibia Public Workers Union (NAPWU) who is the exclusive bargaining agent. The FOA is in the process of engaging in a recognition agreement with this union. The observers have set up observers' committee and shop stewards who are engaging with FAO management on behalf of the observers.

Observer Data: Violations Reported

Number of Reported Violations			
Fishery	**1999**	**2000**	**2001**
Demersal	19	14	20
Mid-water	32	29	38
Pelagic	0	0	0
Other	6	4	12
Total	**57**	**47**	**70**

Number of Summons/Fines Given			
Fishery	**1999**	**2000**	**2001**
Demersal	15	12	17
Mid-water	29	28	36
Pelagic	0	0	0
Other	5	4	10
Total	**49**	**44**	**63**

Number of Prosecutions			
Fishery	**1999**	**2000**	**2001**
Demersal	0	1	1
Mid-water	1	1	0
Pelagic	0	0	0
Other	0	0	0
Total	**1**	**2**	**1**

Number of Successful Prosecutions			
Fishery	**1999**	**2000**	**2001**
Demersal	0	1	1
Mid-water	1	1	0
Pelagic	0	0	0
Other	0	0	0
Total	**1**	**2**	**1**

Observer Coverage

This coverage represents both observers trained to collect scientific data and observers only doing MCS duties.

Total Number of Vessel Days			
Fishery	**1999**	**2000**	**2001**
Demersal	31,779	34,980	34,259
Mid-water	3,841	5,575	3,998
Pelagic	1,442	1,748	1,306
Other	3,518	6,598	5,507
Total	**40,580**	**48,901**	**45,070**

Total Number of Observer Days			
Fishery	**1999**	**2000**	**2001**
Demersal	21,492	23,808	24,995
Mid-water	3,841	5,575	3,998
Pelagic	935	969	653
Other	1,998	3,125	2,790
Total	**28,266**	**33,477**	**32,436**
Percentage	**70**	**68**	**72**

Observer Monitoring, Control and Surveillance Duties

Monitoring of the fishing operations must be done at the following rates and sequence of operation. At least 90% of hauls will be observed on deck (at shooting all gears, and during the haul if a long-liner or at the final stages of drying up the gear if a trawl, or during the pursing and pump-out operation if a purse seine) and a note made of the approximate catch and species composition by Grade 1 observers. At least 90% of all hauls will be checked in terms of the accuracy of recorded log-sheet details, particularly time and position information, as and when the information should be recorded by the captain. At least 90% of the processing operations will be followed to determine if the product weight by species and form is as recorded on the log sheet. The log sheets will be checked periodically during the day (and early the next morning for night hauls) to check if the details recorded correspond with the Observer's own records of events. The Observer (grade 1 and above) will countersign the log sheet if the information contained is believed by him to be a true and representative record. He will NOT countersign if there are serious discrepancies or if a violation has occurred in terms of correct recording of fishing effort, catch or discard data and in this case and others the violation will be recorded (see under).

Control

The Observer will ensure that he checks the following on arrival on board. The fishing Licence, its details and terms to ensure that the vessel is licensed, its details are correct as per the licence. The fishing gear, to see if it complies with the terms of the Licence. From the Licence, he will ensure he is aware of any special conditions imposed on the fishery such as exclusion zones, seasonal closures etc, and that a copy of the Marine Resources Act and Regulations are on board.

Surveillance

The Observer will check the following on a regular basis/ at a suitable time. The fishing gear, to see if it complies with the Marine Resources Act and Regulations in force for that type of gear and fishery, (particularly after gear changes), and that the gear and other conditions of fishing are adhered to by the Captain and crew, and will be on watch to check that dumping of fish is not occurring, dumping of polluting substances, rubbish or non-biodegradable waste is not occurring.

The Observer will, in terms of any suspected violation will record all details in the following forms: Fishery Observer Trip report, Observer Violations Control Report, and Violations Control Form. A note will also be made on the Observer Daily report. He will also make any further notes as he/she sees fit. The observer will inform the Captain that, in his opinion, a violation has occurred and that, depending on the seriousness of the violation, steps should be taken to either reduce the impact of the violation or desist from that or similar actions which are against Namibian Law or Regulations. The Observer will inform the Agency in all but the most minor and technical of violations. The Agency has to decide the action to be taken in each particular case.

NEW ZEALAND

New Zealand Observer Program

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Fisheries Observed

Species	Geographic Location	Gear Type
Hoki	NZ EEZ	Trawl
Southern Blue Whiting	Southern NZ EEZ	Trawl
Jack Mackerel	NZ EEZ	Trawl
Ling	NZ EEZ	Trawl, Longline
Hake	NZ EEZ	Trawl
Orange Roughy	Southern Ocean	Trawl
Oreo	NZ EEZ	Trawl
Tuna	NZ EEZ	Trawl
Squid	Southern NZ EEZ	Trawl
Scampi	NZ EEZ	Trawl
Snapper	Northern NZ EEZ	Longline
Toothfish	Antarctic	Longline

Observer Program Mandate and Authority

Mission of the program: To provide accurate, independent, high quality fisheries information and data to assist in achieving "sustainable fisheries in a healthy aquatic environment."

Fishery management: Government.

Authority to place observers: Legislative power.

Voluntary or mandatory: Some activity mandatory, majority by arrangement (voluntary?).

Funding source(s): Through Government levies on Fishing Industry. Some activity direct charge to Fishing Company involved.

Annual program costs: $2,000,000 NZ.

Fishery Description

Target species covered: Hoki, Southern Blue Whiting, Jack Mackerel, Ling, Hake, Orange Roughy, Oreo, Tuna, Squid, Snapper, Toothfish.

Other commercially landed species: Barracouta, Blue cod, Bluenose, Alfonsino, Cardinal fish, Rock lobster, Elephant fish, Flatfish,Frostfish, Grey mullet, Ghost shark, Gurnard, Hapuku / Bass, John Dory, Blue moki, Oysters, Paua, Ruby fish, Red cod, Ribaldo, Scallop, School shark, Gemfish, Sea perch, Rig, Stargazer, Warehou, Tarakihi, Trevally, Trumpeter, Yellow-eyed mullet, Kahawai, Butterfish, Garfish, Kingfish, Pilchard, Skate.

Bycatch of non-target species: Marine mammals, Seabirds.Turtles (rare events).Sea snakes (rare events). Various quota and non-quota fish species.

Gear types: Trawl (bottom, mid water, pinnacle), Longline (surface, bottom, drop).

Area of operation: Within the New Zealand Exclusive Economic Zone (EEZ), Outside the NZ EEZ, CCAMLR region (Antarctic).

Number of vessels participating in fishery: Hoki 100, Southern Blue Whiting 7, Jack Mackerel 32, Ling 87, Hake 23, Orange Roughy 58, Oreo 28, Tuna 696, Squid 47, Snapper 252, Toothfish 3.

Size range of vessels: 3.6m–104.5m.

Months of operation: A ll months.

Annual catch of target species: Hoki 100, Southern Blue Whiting 7, Jack Mackerel 32, Ling 87, Hake 23, Orange Roughy 58, Oreo 28, Tuna 696, Squid 47, Snapper 252, Toothfish 3.

Observer Program Management

Brief overview of program structure: The Ministry of Fisheries' Science group determines the sampling design for observers to follow. All database maintenance and security, and the data entry, editing, quality assurance and control for all longline trips is the responsibility of the Ministry of Fisheries' Research Data Management group. The data entry, editing, quality assurance and control for all trawl trips is the responsibility of the Ministry of Fisheries' Observer Programme. The hiring, training and deployment of observers is the responsibility of the Ministry of Fisheries' Observer Programme.

Number of observers: Currently 53 observers.

Observers employed by: Observers are employed as fixed term employees. Each period of employment is covered by a separate agreement (contract) and a new agreement is signed for each trip to sea as an observer.

Average deployment length: Ministry of Fisheries observers cover a number of different fisheries and vessels, the average trip and period of employment being 5 weeks.

Observers unionised: Individual choice—some are, some aren't.

Number of violations issued annually based on observer data: Variable, depending upon compliance priorities.

Observer Coverage

Average number of observed fishing days (or other unit of effort): 5,500 sea days per year. Definition of fishing day (or other unit of effort): Reported in terms of observer sea days, a sea day being any part of an observer's 12-hour shift that they are on a vessel. If two observers are on the same vessel, each 24-hour period equates to 2 sea days (one 12 hour period per observers).

Percent observer coverage (and basis for coverage): With the number of different fisheries observed, this is very variable. Some fisheries require 100% coverage and other fisheries have minimal percentage coverage. The Ministry of Fisheries' Science group determines the basis for coverage levels for stock monitoring information. The Department of Conservation also requests levels of coverage for non-fish bycatch interactions and capture information. The Ministry of Fisheries' Compliance and Fisheries Management groups can also request the observer coverage is achieved for particular fisheries or vessels.

PAPUA NEW GUINEA

Papua New Guinea Observer Program

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Location: Papua New Guinea, being an island nation, shares common land and sea border with the Indonesian province of West Papua and maritime borders with Australia, Solomon Islands and Federated States of Micronesia. Its Exclusive Economic Zone (EEZ) including the continental shelf constitutes approximately 75% or 2.3 million square kilometres of the total land mass.

Target species and gear types: Skip Jack Tuna (Purse Seine Fishery), Yellow fin Tuna, Big Eye Tuna (Long line Fishery), Prawns (Prawn Trawl Fishery), Torres Strait Protected Zone.

Observer Program Mandate and Authority

Mission of the Observer Programme Management Team: Until there are sufficient skills in the private sector to provide the service, NFA Observer management must ensure the following:

- Trained observers are deployed to monitor compliance with fisheries management measures.
- Adequate observer and port sampling coverage vessels is achieved.
- Information gathered by observers is subject to quality control and suitably disseminated.
- Work is fairly and appropriately allocated and observers are correctly remunerated.

Fishery management (Federal/state/local): Is the responsibility of the National (Federal) Government through the National Fisheries Authority (NFA). NFA is responsible for the management and development of the fisheries sector.

Authority to place observers: Is vested with the Managing Director of the National Fisheries Authority and is exercised through the Manager Observer Program.

Voluntary or mandatory: Under the Fisheries Management Act 1998, the National Fisheries Authority is responsible for the establishment of the Observer Program, appointment of observers and outlines the powers an duties to observers and also states the conditions for observers. he Act also set the conditions in which obstructions to any observer process constitutes an offence.

Funding source(s): The observer funding comes from the licence fees that are paid by fishing companies on an annual basis. The observer cost component forms part of the general licence fees charged to the fishing industry.

Annual program budget: The annual program budget for this year is PNG K964,329.00.

Fisheries Description

Tuna Longline Fishery

Targeted species: Yellow fin tuna (YFT); Big eye tuna (BET).

Other commercially landed species: Albacore—Local market.

Bycatch of non-target species: Sailfish, Blue marlin, Black marlin, Sword fish, Stripe marlin, Moon fish, Oil fish, Long fin mako shark, Short fin mako shark, Oceanic white-tip shark, Pelagic thresher shark, Big eye thresher shark, Blue shark, Silky shark, Sea turtles.

Gear type(s): Note that the gear types for this fishery differ for the shark (long line) and the tuna (long line).

Tuna Longline Fishery Gear Types

Gear Specifications	Tuna Long Line	Shark Long Line
Number of hooks per set	1,120 hooks	1,920 hooks
Distance between branch lines	40 meters	30 meters
Length of float lines	18 meters	40 meters
Number of hooks per basket	04 hooks	40 hooks
Thickness of mainline	07 mm monofilament	08 strand kuralon x 10 mm
Thickness of mainline	02 mm monofilament	03 strand poly propylene x 08 mm

Area of operation: Six miles from any land, island or declared reef within PNG, EEZ.

Number of vessels participating in the fishery: Carrier vessels—03 vessel; Tuna long line—43 vessels.

Size range of vessels: Length: about 22 meters–35 meters; GR:about 75 GRT–100 GRT.

Months of operation: Most of these long liners stay out at sea depending on their storage facility for keeping the quality of their products (fish) at a marketable quality and also their trip provisions like food, water, fuel and other essentials. A trip can vary from 1 to 3 weeks depending on type of operations. Vessels that tranship at sea stay longer.

Tuna Purse Seine Fishery

Target species: Tuna (Yellowfin, Bigeye, Skipjack).

Other commercially landed species: Rainbow runner.

Bycatch of non-target species: Blue marlin, Black marlin, Striped marlin, Short bill spear fish, Sword fish, bat fish, frigate tuna, bullet tuna, kawakawa, Wahoo, barracudas, Bigeye Trevallies, mahi-mahi, file fish, trigger fish, mackerel scads, triple tail, pomfrets and ocean breams, marine turtle, Oceanic white tip shark, Silky shark, Hammerhead shark, manta ray, etc.

Gear types: Main net-1,000 fth (LL), 120 fth (dth), Mesh size-6" (main net), 3.5" (bag).

Area of operation: PNG 200nm EEZ, regional waters.

Number of vessels participating: Catcher vessel—25; Mother ships/Carrier vessels—31; Light/Ranger boats—45; Tanker/Bunker—2; Total—103 (in this particular fishery alone).

Size range of vessels: 13.2-84.96 meters.

Months of operation: Year round, unless notified by NFA.

Annual catch of target species: More than 94,645.7 metric tonnage.

Average number of fishing days per year: Domestic fleet: 5,040; foreign fleet: 10,332.

Prawn Fishery

Target species: Banana Prawns, Giant Tiger prawns, Red Endeavour or Greasy back, Brown Tiger Prawns, Red Spot King Prawns, Blue Endeaour Prawns.

Other commercially landed species: Japanese tiger prawn or kuruma prawn, York Prawn, Grooved Tiger or green tiger, Demon Prawn, Coral prawn, Rainbow prawn, squids,, cuttlefishes, slipper lobster (commonly called bugs), silver teraglins, jewfishes, snappers, trevallies, flounders and trumpeter perch.

Bycatch or non-target species: Stingrays, flounders, goat fishes, herrings, sardines, glass eyes, bulleyes, sweetlips grunts, promfrets, ponyfishes, porcupine fishes, pufferfish, snappers, trevallies, threadfin breams, anchovies, pilchards, silver teraglins, jewfishes, tripodfishes, groupers, mantis shrimp, red emperors, parrotfishes, lizard fishes, bombay ducks, catfishes, and sharks (zebra sharks, hammer head sharks, blacktip sharks).

Gear types: The Japanese style which is mainly made up of 2 x 18 fathom nets (pair trawling, one on each side of vessel). The Australian style, which is the 4 gear type mainly made up of 4 x 16 fathoms nets (two or each side of vessel).

Area of operation: The area of operation for the prawn trawl fishery is in the Gulf of Papua and the Torres Strait Protected zone (TSPZ) excluding 3 miles within any shore base line.

Number of vessels participating in the fishery: 15 trawlers from 8 companies operating in the Gulf of Papua and 3 trawlers with trial permit operating in the TSPZ.

Size range of vessels: 19.3 metres (F/V AKI) to 26.5 metres (F/V REGINA) in length.

Months of operation: Year round. Each vessel operates up to about 7 trips per year. The timed area closure of the major prawn fishing ground starts on the 1st December until 31st March.

Annual catch of target species: 1,000 mt /year in export. Total actual catch is higher.

Average number of fishing days per year: Average number of fishing days for trawlers in the TSPZ would be 210 days per year while the trawlers in the Gulf of Papua would roughly average 300 days per year per vessel.

Observer Program Management

MANAGING DIRECTOR NFA	Appointment of observers
SOUTH PACIFIC COMMISSION (SPC)	Sampling design
NATIONAL FISHERIES AUTHORITY	Hiring of observers
SPC and NFA	Training observers
NFA OBSERVER PROGRAM	Deployment of observers
NFA OBSERVER AND SPC	Data entry
SPC	Data editing
NFA OBSERVER PROGRAM AND SPC	Quality assurance
NFA/SPC	Database maintenance and security

Number of observers: 50 trained observers and (15) port samplers.

Observers employed by: Observers are employed by the National Fisheries Authority on contract basis based on a trip-by-trip arrangement.

Average deployment length: Domestic purse seiners observers—6 weeks; long liner observers—2-3 weeks; operations associated with mother-ship type transshipment may take longer. Prawn Trawl observers—5 weeks.

Average observer retention rate: About 10% of observers have left the program per year for the last 2 years. This is also due to the fact that the National Fisheries Authority was going through a restructure and hence observers were affected by the process. The program is hoping that the current rate will reduce to one per annum after the reform.

The program has lost observers through the following: observer turned Fisheries Officers (5), observer losing interest (2), observer venturing into other vocations (1), observer demoted to port sampling duties only (7), observer terminated (2), observer deceased (1).

Observers unionised: No.

Number of violations issued annually based on observer data: The common violations issued annually are misreporting of by-catch /discards on log sheets or required reports, no filling if log sheets during trip, pollution from observed vessel, fishing in prohibited areas, obstruction of other duties and intimidation, and difficulty accessing communication equipment.

Observer coverage: Average number of observed fishing days (or other unit of effort): Purse seine (domestic) 378 days, Mothership 1,806 days, (Foreign) 714 days, Long line 600 days, Prawn 462 days.

Definition of fishing day (or other unit of effort): One full day at sea including periods when vessel is not actively catching. Covers all days from the start of the trip to the end of trip.

Percent observer coverage: Total number of days covered by observer, divided by the annual total number of fishing days.

Percentage coverage is based on the following: Long line 6%, Purse seine (domestic) 100% (extra compliance need), Purse seine (foreign) 6% currently (increasing to 20%), Prawn 6% (Increase to 20% during lobster migration into the same fishing ground for 3 months).

SOUTH AFRICA

South African Offshore Resources Fishery Observer Program

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Capricorn Fisheries Monitoring cc (Capfish cc) deploys Observers principally within the Exclusive Economic Zone (EEZ) around Southern Africa and the EEZ around the Prince Edward Islands. In addition Capfish cc has worked on contracts to deploy Observers in CCAMLR areas in the Ross Sea, around Heard Island and South Georgia and in international waters.

Main Fishing Sectors of the Observer Program

Main Sector	Target Species		Gear
Deepsea Trawl	Hake	*Merluccius paradoxus* *Merluccius capensis*	Demersal trawl
Mid-water Trawl	Horse Mackerel Mackerel	*Trachurus trachurus capensis* *Scomber japonicus*	Mid-water trawl
Inshore Trawl	Hake Sole (various species)	*Merluccius capensis* *Soleidae*	Demersal trawl
Prawn Trawl	Prawn (various species)	*Penaeidae*	Demersal trawl
Purse seine	Pilchard Anchovy	*Sardinops sagax* *Engraulis capensis*	Purse seine
Longline Hake	Hake	*Merluccius paradoxus* *Merluccius capensis*	Demersal Longline
Longline Tuna	Tuna Swordfish		Pelagic Longline
South Coast Rock Lobster	Rock lobster	*Palinurus gilchristi*	Trap Longline
Longline Toothfish	Toothfish	*Dissosticus eleginoides*	Demersal Longline

Number of Vessels and Average Trip Length and Number of Observer Days Required for Each Fishery

Fishery	Number of Vessels	Number of Trips per Year	Average days per Trip	Total Number of Observer Days
Trawl Deep-sea				
Freezer	15	17	34	579
Wetfish	46	221	7	1,584
Midwater	1	8	40	320
Trawl Inshore				
Hake	21	71	10	710
Sole	12	40	10	400
Prawn Trawl	8	4	30	120
Purse-seine				
RSW/CSW	8	108	2.5	270
Dry	59	1,200	1.5	1,800
Bait-Iced	17	500	1	500
Longline Hake	66	250	3	800
Longline Tuna	24	120	10	1,200
Longline Rock Lobster	12	24	12	290
Experimental Fisheries				
Longline Toothfish	3	15	60	900
Foreign Toothfish	6	6	67	400
Trawl	4	23	23	

Required Observer Coverage of Fishing Effort and Catch for Each of the Main Sectors

Sector	Observer Coverage	Unit of Effort	Percentage of Effort to Be Sampled	Average Catch Weight (tonnes)	Percentage of Catch Sampled
Deepsea Trawl	15%	Single Trawl	75%	5	6 to 10%
Mid-water Trawl	100%	Single Trawl	100%	65	1%
Inshore Trawl	15%	Single Trawl	75%	1.5	14%
Prawn Trawl	15%	Single Trawl	33%	0.02	25%
Purse seine	15%	Single Throw	100%	80	0.01%
Longline Hake	15%	Single Set	100%	5	50%
Longline Tuna	20%	Single Set	100%	1.5	80 to 100%
South Coast R/Lobster	15%	Single Set	50%	0.5	35%
Longline Toothfish	100%	Single Set	100%	1.2	50%

Fishery Description

Demersal Deepwater Trawl for Wetfish and Frozen Fillets		
Target Species		Hake *(Merluccius paradoxus, M. capensis)*
Commercial By-catch		Kingklip *(Genypterus capensis)* Ribbonfish *(Lepidopus caudatus)* John Dory *(Zeus faber), Z capensis)* Monk fish *(Lophius spp)* Jacopever *(Helicolenus dactylopterus)* Horse mackerel *(Trachurus trachurus capensis)* Mackerel *(Scomber japonicus)*
Discarded By-catch	Finfish	Granadiers, Eels (*Conger wilsoni*)
	Sharks, Rays & Chimaeras	*Squalus spp., Raja spp., Torpedo nobiliana, Callorhinchus capensis, Chimaera spp.*
	Invertebrates	Squid *(Tadarodes spp. Loligo vulgaris), Octopus spp.*
	Marine mammals	Seals (*Arctocephalus pusillus pusillus)*
	Sea turtles	Seldom caught
	Sea birds	Occasional Gannets (*Morus capesis)*
Gear		Demersal otter trawl gear
Area of Operation		South African West and South coast
Number of Vessels in Fishery		61
Size range of the vessels		35 to 110 meters
Season		All year
Total annual catch of target species		165,000 tonnes
Average number of fishing days / year		14,180 days

Mid-water Trawling		
Target Species		Horse mackerel *(Trachurus trachurus capensis)*
Commercial By-catch (All fish by-catch turned into fish meal)		Mackerel *(Scomber japonicus)* Ribbon fish *(Lepidopus caudatus)* Hake *(Merluccius spp.)*
Discarded By-catch	Finfish	Puffer fish *(Amblyrhynchotes honckenii, Chelonodon patoca, Gastrophysus spadiceus)* Sun fish *(Mola mola)*
	Sharks	Bronze whaler *(Carcharhius brachyurus)* Mako *(Isurus oxyrinchus)*
	Invertebrates	Squid *(Tadarodes spp. Loligo vulgaris)*
	Marine mammals	Dolphin (*Delphinus delphus*)
	Sea turtles	Occasionally caught (*Caretta caretta*)
	Sea birds	Occasional Gannets (*Morus capesis)*
Gear		Mid-water trawl
Area of Operation		South African South coast
Number of Vessels in Fishery		1
Size range of the vessels		110 meters
Season		All year
Total annual catch of target species		30,000 tonnes
Average number of fishing days / year		320 days

Demersal In-shore Trawl for Hake and Sole		
Target Species		Hake *(Merluccius capensis)* Sole *(Austroglossus pectoralis)*
Commercial By-catch		*Genypterus capensis, Lepidopus caudatus, Zeus faber, Z capensis, Lophius spp, Helicolenus dactylopterus, Trachurus trachurus capensis, Scomber japonicus*
Discarded By-catch	Finfish	Grenadiers, Puffer fish *(Amblyrhynchotes honckenii)*
	Sharks and rays	*Squalus spp., Raja spp.*
	Invertebrates	*Tadarodes spp. Loligo vulgaris, Octopus spp.*
	Marine mammals	Seldom caught due to smaller nets
	Sea birds	Occasional Gannets 9*Morus capensis)*
Gear		Demersal otter trawl gear
Area of Operation		South African South coast
Number of Vessels in Fishery		21
Size range of the vessels		15 to 27 meters
Season		All year
Total annual catch of target species		Hake 10,000 tonnes Sole 900 tonnes
Average number of fishing days / year		Hake 4,723 Sole 2,667

Purse-seine		
Target Species		Pilchard *(Sardinops sagax)* Anchaovy *(Engraulis capensis)*
Commercial By-catch (All fish by-catch turned into fish meal)		Horse mackerel (*Trachurus trachurus capensis)* Mackerel (*Scomber japonicus)* Redeye (*Etrumeus whiteheadi*) Lantern Fish (*Lampanyctodes hectoris*)
Discarded By-catch	Finfish	None
	Sharks	Sun fish *(Mola mola)*
	Invertebrates	Squid (*Tadarodes spp., Loligo vulgaris)*
	Marine mammals	Seals (*Arctocephalus pusillus pusillus)* Dolphin (*Delphinus delphus*)
	Sea turtles	Seldom caught
	Sea birds	Occasional Gannets (*Morus capesis)*
Gear		Purse-seine net
Area of Operation		South African West and South coasts
Number of Vessels in Fishery		84
Size range of the vessels		12 to 37 meters
Season		1 January to 31 November
Total annual catch of target species		Pilchard 260,000 tonnes Anchovy 360,000 tonnes
Average number of fishing days / year		17,133 days

Demersal Hake Longline		
Target Species		Hake *(Merluccius paradoxus M capensis)*
Commercial By-catch		Kingklip *(Genypterus capensis)* Jacopever (*Helicolenus dactylopterus)*
Discarded By-catch	Finfish	Eels (*Conger wilsoni*)
	Sharks & rays	*Squalus spp., Raja spp.*
	Invertebrates	*Octopus spp.*
	Marine mammals	Seals (*Arctocephalus pusillus pusillus)* Not caught but are problematic for taking fish off the line and are shot by the fishermen
	Sea turtles	Seldom caught
	Sea birds	Occationally White-chinned Petrels (Procellaria aequinoctialis) and Albatross (Diomeidae spp) are caught.
Gear		Demersal Lonelines (Spanish double line system)
Area of Operation		South African West and South coast
Number of Vessels in Fishery		66
Size range of the vessels		12 to 37 meters
Season		All year
Total annual catch of target species		10000 tonnes
Average number of fishing days / year		5,333 days

Tuna Longline		
Target Species		Yellowfin tuna (*Thunnus albacares*) Bigeye tuna (*T. obesus*) Southern bluefin tuna (*T. maccoyii*) Swordfish (*Xiphias gladius*)
Commercial By-catch		Oilfish (*Ruvettus pretiosus)* Dorado (Coryphaena hippurus) Blue shark (*Prionance glauce)* Mako shark (*Isurus oxyrinchus)*
Discarded By-catch	Finfish	Lancet fish *(Alepisaurus ferox)*
	Sharks & rays	Pelagic Rays *(Pteroplatytrygon violacea)* Sun fish *(Mola mola)*
	Marine mammals	Killer Whales (*Orcinus orca*). Not caught but are problematic for taking fish off the line and are shot by the fishermen
	Sea turtles	Seldom caught
	Sea Birds	Occationally White-chinned Petrels *(Procellaria aequinoctialis)* and Albatross (*Diomeidae spp*) are caught.
Gear		Pelagic Longline
Area of Operation		South African West South and East coast
Number of Vessels in Fishery		24
Size range of the vessels		12 to 37 meters
Season		All year
Total annual catch of target species		30 experimental permits issued. No TAC
Average number of fishing days / year		6,000 days

Toothfish Longline		
Target Species		Toothfish *(Dissosticus eleginoides)*
Commercial By-catch		Grenadiers (*Macrourus spp.)*
Discarded By-catch	Finfish	*Grenadiers (Macrourus spp.)* Blue antimora *(Antimora rostrata)*
	Sharks & rays	*Raja spp.*
	Marine mammals	Killer whales (*Orcinus orca*) responsible for taking fish off the line but never caught. Observer presence most probably prevents action taken by the fishermen.
	Sea turtles	Not caught
	Sea birds	White-chinned Petrels (*Procellaria aequinoctialis*) Albatross (Diomeidae spp)
Gear		Demersal Longline Double and single line system are used.
Area of Operation		South African EEZ around the Prince Edward Islands and the high seas North of the 45° Latitude
Number of Vessels in Fishery		3
Size range of the vessels		47 to 90 meters
Season		01 December to 31 September
Total annual catch of target species		1,200 tonnes
Average number of fishing days / year		900

South Coast Rock Lobster		
Target Species		South coast rock lobster (*Palinurus gilchristi*)
Commercial By-catch		West coast rock lobster (*Jasus lalandii*) *Octopus spp.*
Discarded By-catch	Finfish	*None*
	Sharks & rays	*Squalus spp.*
	Marine mammals	Not caught
	Sea turtles	Not caught
	Sea birds	Not caught.
Gear		Demersal trap longline
Area of Operation		South African South coast
Number of Vessels in Fishery		12
Size range of the vessels		35 to 60 meters
Season		All year with an industry voluntary closure from May to August, except for live export fish.
Total annual catch of target species		365 tonnes
Average number of fishing days / year		1,933

Observer Program Management

Prior to May 2002 the South African department of Marine and Coastal Management (MCM) specified observer coverage in the permit conditions for the various fisheries. The fishing companies or vessel owners were responsible for the costs of the Observer. The current Observer program for the South African offshore fishery however, is now funded by the state. The annual program costs are approximately R5.3 million (0.5 million $).

Infrastructure: CapFish cc is based close to Cape Town harbor where deployments, training, report submissions and logistics are conducted from their office in Paarden Eiland. In addition CapFish cc field officers are located in Port Elizabeth, Mossel Bay and Saldanha Bay who attend to the logistics of observer deployments in these areas.CapFish cc supplies all observers with Notebook PC's if needed and all gear as required for routine data collection. All observers are briefed and debriefed fully as required and sign contracts and confidentiality agreements.

Data processing: The data collection requirements for each sector of the fishing industry are specified by MCM Coordinators to satisfy the scientific requirements for the management of fishery. All data collected onboard is recorded on sector-specific data sheets. On longer and high profile trips the observers are also required to enter their data onto either a notebook-PC or onboard computer supplied by the company. Finally all the data recorded is entered onto a central database at the company's offices in Cape Town.

Observer requirements: All observers and field samplers are contracted to *CapFish cc* and have fixed terms and agreements. Rates are fixed and insurance and tax obligations specified in each contract. The company currently employs 25 observers of which 14 have worked for the company for more than three years. An active recruitment and training program was initiated from June 2002 to meet the needs of the offshore observer program for up to 50 active observers.

Employed by: Capfish Observers are employed strictly in data collection roles and are not required to perform compliance functions at sea. However, any transgressions observed are recorded and reported. This information is used by MCM to address compliance issues on a management level where corrective action is agreed upon and implemented by the fishing industry.

Observer recruitment and training: CapFish cc is acutely aware of the need for job creation and the development of Previously Disadvantaged Individuals in South Africa and recognizes the need for a structured observer-training scheme. We provide initial in-house personalized training for all observers—this is normally sector specific. Follow-up training is given as observers move between sectors and they gain in experience. An essential component of the observer's initial training includes an internationally recognized safety and survival training course at the *Cape Technikon Survival Centre*. Observes also have the opportunity to get formal advanced training in navigation, communication and scientific sampling methods from established training institutions.

Observer deployments: The company has appointed a number of area co-ordinators who are responsible for deploying observers on designated vessels. The co-ordinators are also responsible for briefing the observers as to any specific tasks required for a trip and collecting and checking the data sheets when the observers return. In addition Capfish has been contracted to supply three land based technicians to assist with the sampling and analysis of fish landed by the purse-seine fishery.

Observer Coverage

An Observer sea-day is considered as any period longer than 12 hours onboard the vessel. Observer trips vary according to the sector covered and varies from 1 to 120 sea days. Similarly the percentage coverage of fishing effort and the proportion of the catch sampled is dependent on the sector. Within the purse seine fishery, where large tonnages are caught in a single operation (i.e., 80 to 250 tonnes) but the species composition is relatively uniform comprising of only one or two main species, then a catch sample can be only a fraction of 1%. However in the longline fishery, the normal coverage is from 75% to 100% of the catch and 100% of the effort on any one trip.

UNITED KINGDOM

Catch Sampling of English and Welsh Fisheries

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All English and Welsh registered vessels are included in the sample population irrespective of gear, target species, or operation/home port.

Observer Program Mandate and Authority

Mission: To collect and provide data on fish discarded at sea that can be used to aid in fisheries management issues and to meet the requirements specified in European Commission Regulation no.1639/2001 for monitoring fisheries.

Fishery management: The European Commission decides fisheries policy initially and then each member country is responsible for implementing this policy and any management issues.

Voluntary or mandatory: Access to vessels and catches for biological sampling is purely voluntary and the UK has no authority to place observers aboard vessels.

Funding source(s): The programme is jointly funded by the UK government and the EC.

Annual program cost: The estimated annual cost of the catch sampling project is 845,000 .

Fishery Description

Vessel size: Only vessels greater than 10m registered length will be sampled because of safety issues. All UK fisheries will be targeted for sampling and all species whether they are target species, marketable bycatch or discards will be measured. Birds, finfish, commercial shellfish, mammals and main benthic organisms will be quantified.

Gear types: The main gear types used are beam trawl targeting shrimp and flatfish; otter trawl and pair trawl for mixed round and flatfish; Nephrops trawl for *Nephrops norvegicus*; midwater trawl for pelagic species; gillnets and longlines; and some shellfish potters.

Area of operation: All waters around the UK coastline will be covered for vessels sailing from the UK and other European countries.

Fleet size: The total UK registered fleet in 2001 was 4,092 vessels, of which over 3,400 vessels were <10m, 230 active vessels were >10m<12m, 255 active vessels were >12m<24m and 132 active vessels were >24m, registered length.

Months of operation: Most vessels work all year round but swap between gears to maximise catches—e.g., beam trawls may switch to scallop dredge in summer, otter trawls often switch to Nephrops trawl in winter in the North Sea.

Annual catch of target species: The annual catch of mixed fish and shellfish in the UK for 2001 was 110,600 tonnes.

Average number of fishing days per year: The whole >10m registered fleet spent 87,101 days on the fishing grounds in 2001.

Observer Program Management

Onboard catch sampling by CEFAS started in 1994 on the north east coast fisheries concentrating on cod, haddock and whiting. This was extended to cover all species in 1999 and all coastal areas in 2000. Now new EC regulations (EC Regulation 1639/2001) require specific species and fisheries to be assessed for quantities discarded by all European member states. CEFAS was contracted to design a sampling strategy, hire and

train observers, and produce technical reports and data for stock assessment working groups. The Project Leader (Grant Course) is responsible for the day-to-day running of the project and that objectives are completed on time and to cost. He is also responsible for database management, security and data analysis. The Observers are responsible for randomly selecting a vessel, negotiating access, carrying out the sampling and data entry.

Number of observers: Historically only 2 or 3 Observers were employed at any one time. However this will increase to 8 Observers to meet the new EC regulations.

Average trip length: The average trip length is approximately 4 days, with 12 hours being the shortest and 21 the longest.

Average observer retention rate: In general one observer needs to be replaced per year.

Observers unionized: All observers have full civil service rights and union membership is optional.

Number of violations issued annually based on observer data: No data is used for enforcement purposes. Fishing vessel participation is purely voluntary so all data is confidential until sufficiently aggregated.

Observer Coverage

Average number of observed fishing days: Each Observer is required to undertake 100 days at sea per year, giving a total of 800 days per year.

Sampled effort: Sampled effort is at haul level and uses hours fishing. Approximately 0.3% of total fishing effort has historically been sampled. However this should increase with the employment of the new Observers to meet the EC Regulations.

Monitoring of Discarding and Retention by Trawl Fisheries in Western Waters and the Irish Sea in Relation to Stock Assessment and Technical Measures

(EU Contract ref. 98/095)

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Fisheries observed: The main demersal trawl fisheries (meters) from prosecuted by UK and Spanish fishers in Western waters (west coast of Europe approx. 39-58-N) over a period of at least 15 months during 1999-2001. Gears were otter trawl, *Nephrops* trawl including twin trawl, midwater demersal trawl, pair trawl including Very High Vertical Opening (VHVO) and also beam trawl.

Observer Program Mandate and Authority

This was a research project funded by the European Commission, and obtained data on discarding and retention in Western waters trawl fisheries. Participation by fishers was voluntary. As well as providing data for ICES working groups engaged in stock assessment, the project also obtained information on the reasons for discarding, and examined the use of discard data in the assessment of technical measures designed to reduce discarding. Although the project was of limited duration, there was a major change in the technical regulations that occurred during the course of the project, and it was possible to track changes in catches and discarding

behaviour. Also discussed were possible consequences of measures designed to reduce discarding and the status of the exploited stocks. In addition, a project designed to test a method whereby Fishers could sample their own discards was carried out (this was UK Government funded).

Fishery Description

Catches and discarding practices from a total of 26 meters, as defined by the participants, are described in the project report and some will be summarised on the poster. Also, benthos catches are described for otter and beam trawling off SW England.

Observer Program Management

This was a collaborative research project. The project partnership was composed of Seafish (Co-ordinator and UK Celtic Sea) AZTI, Instituto Español de Oceanografía (Basque Country and western Spain respectively), Queens University Belfast (Irish Sea), and University of Plymouth (Benthos sampling). Each participant carried out quantitative surveys, using on board observers, of the levels of discarding by species and length. The identities of individual vessels were confidential and data is presented in aggregated form. Each participant was responsible for their own data collection and management but the outputs are raised and presented in a standardised format.

Observer Coverage

All participants had at least 2, and in some cases, 3 Observers. The coverage is reflected in the factors that will be discussed in the poster where relevant.

South Georgia and South Sandwich Islands Observer Programme

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Observer Program Mandate and Authority

South Georgia and the South Sandwich Islands are to be found in the region of 55°S and 40°W and the management of the fisheries resources fall within the area of responsibility of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). All fisheries in the South Georgia and South Sandwich Islands Maritime Zone (SGMZ) have observers deployed under the CCAMLR Scheme of Scientific Observation, managed from London by MRAG Ltd.

The CCAMLR Scientific Committee has developed a set of research priorities for each fishery and the scheme of scientific observation has been drawn up to address these priorities as agreed by the Member states designating and receiving observers. CCAMLR requirements state that all fishing vessels from member states must all carry international observers of another member state.

Fishery Description

Currently fisheries exist inside the SGMZ for Patagonian toothfish (*Dissostichus eleginoides*), Antarctic icefish (*Champsocephalus gunnari*) and krill (*Euphausia superba*). The observer programmes for each fishery have been designed to address both compliance scientific aspects of the fisheries, collecting catch and effort data, biological information on catch and by-catch species and ensuring that vessels are adhering to CCAMLR regulations in place to minimize the incidental mortality of seabirds and marine mammals.

Observer Program Management

MRAG Ltd are responsible for the management of all aspects of the observer programmes, including recruitment, training, deployment, briefing and de-briefing, and the development of databases to be used at sea and on land for data entry and analysis.

UNITED STATES

Northwest Atlantic Sustainable Fisheries Support

David Potter, Chief, Fisheries Sampling Branch, NOAA/NMFS, NEFSC, 166 Water St., Woods Hole, MA 02543, (508) 495-2000

Observer Program Mandate and Authority

Mission of the program: The NMFS Northeast Fisheries Science Center (NEFSC), NMFS is required to collect scientific, management, and economic data about fisheries through observers placed aboard U.S. domestic and foreign fishing vessels. NMFS also has specific responsibilities concerning marine mammals and sea turtles within Federal and state waters.

Authority to place observers: Marine Mammal Protection Act and Magnuson-Stevens Fisheries Management and Conservation Act. Specifically, the following Fishery Management Plans (FMP) authorize mandatory observer coverage for any gear being used in the Northwest Atlantic: northeast multispecies; squid, mackerel, butterfish; summer flounder; scup; black sea bass; sea scallop; monkfish; and swordfish.

Voluntary or mandatory: Primarily mandatory. Dependent on the Fisheries Management Plan, bycatch levels, and annual categorization under the MMPA.

Program duration: The domestic fisheries sampling program began in 1989 with collection of catch and discard data from various northwest Atlantic trawl fisheries, primarily targeting groundfish. The program has expanded to cover bottom longline, sea scallop dredge, sea bass pot, lobster pot, squid trawl, scup trawl, shrimp trawl, whiting trawl, monkfish trawl, summer flounder trawl, herring mid-water trawl, herring mid-water pair trawl, and surf clam dredge fisheries. However, due to highly variable annual funding and changing priorities in response to short term management needs, coverage of fisheries and gear types has varied over the duration of the program.

Fishery Description

Target species: Northeast multispecies groundfish (Atlantic cod, witch flounder, American plaice, yellowtail flounder, haddock, pollock, winter flounder, windowpane flounder, redfish, white hake, Atlantic halibut, and ocean pout), monkfish, summer flounder, Illex (short-finned) squid, Loligo (long-finned) squid, Atlantic mackerel, scup, spiny dogfish, weakfish, bluefish, Atlantic croaker, black sea bass, swordfish, tunas, surf clams, Atlantic herring, shrimp, sea scallops and American lobster.

Other commercially landed species: Butterfish, sharks, weakfish, bluefish, flounders, hakes, dogfish, skates, tautog and tilefish.

Bycatch: Common dolphins, pilot whales, various sea turtles, various seabirds, finfish and invertebrates including non-target species or target species that are discarded for lack of market or by regulation such as closed seasons or sub legal size.

Season of operation: Year round.

Average number of fishing days per year: Under the Northeast Multispecies FMP, vessels fishing under the Fleet Days at Sea (DAS) permit, Individual DAS permit, and the Large Mesh DAS permit have an annual allocation of days. Of these allocated days, a total of 49,000–64,000 have been used within a year.

Observer Program Management

Brief overview of program structure: Program responsibilities are shared between NMFS and one contracted observer provider. The contractor provides observer candidates for training and testing by NMFS. An annual schedule for sea day coverage is provided by NMFS to the contractor. The contractor supervises and deploys observers and assures delivery of data to NMFS.

Service delivery type and function of each entity: NMFS is responsible for complete funding of the program. Via direct contract with NMFS, an observer contractor is responsible for observer recruiting, deployment, logistics, gear, insurance and delivery of observer data to NMFS. NMFS is responsible for training and certifying and debriefing observers, editing, entering and auditing data, and responding to data and coverage level requests using both NMFS staff employees and contractors working on site. NMFS also ensures that the sea day schedules are being met and that vessel selection is being done fairly and appropriately.

Observer Coverage

Unit and definition of fishing effort for purpose of estimating coverage: A sea day is defined as a day when the vessel is not at the dock. This includes time spent steaming to, from and between fishing grounds, time doing repairs at sea or waiting for weather at sea, and time deploying or retrieving gear or time spent searching for fish. Sea days are computed from when the vessel leaves port until the vessel returns to port and lands its catch. In 2003, over 5,000 days were covered in the various fisheries.

Fraction of fishing activity observed: The total fraction of all fisheries covered may range from less than 1% to greater than 5%.

Closed Area Atlantic Sea Scallop Dredge Fishery

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Observer Program Mandate and Authority

Mission of the program: The Northeast Fisheries Science Center (NEFSC), NMFS is required to collect scientific, management, and economic data about fisheries through observers placed aboard U.S. domestic and foreign fishing vessels. These data, which cannot be obtained dockside or while aboard government research vessels, are necessary for the management of fisheries occurring in the U.S. Exclusive Economic Zone (EEZ) as well as the management of fisheries occurring on the high seas outside the EEZ. NMFS also has specific responsibilities concerning marine mammals and sea turtles within Federal and state waters.

Fishery management: Federal.

Authority to place observers: Magnuson-Stevens Fisheries Management and Conservation Act (Atlantic Sea Scallop Fishery Management Plan).

Voluntary or mandatory: Mandatory. Vessels must have either an observer assigned or a waiver granted for each trip.

Program duration: This initial exemption fishery within the Georges Bank Closed Area II opened June 15, 1999 and closed Nov 2, 1999. The program has continued in following years to include additional closed areas off southern New England, Georges Bank, and the Mid-Atlantic.

Fishery Description

Target species: Atlantic Sea Scallop.

Other commercially landed species: Monkfish, winter flounder, summer flounder, and yellowtail flounder.

Bycatch: Crabs, various hakes as well as several flounder species may be discarded for regulatory reasons. Sea turtles have been caught or struck. There was no bycatch of marine mammals or sea birds in observed hauls.

Fleet size: A total of 250 vessels possess limited entry permits.

Season of operation: Variable per year.

Catch of target species: In 1999, about 5.5 million pounds of sea scallop meat were landed.

Average number of fishing days per year: In 1999, each vessel was allowed 3 trips with catch not to exceed 10,000 pounds. If an observer was on board each vessel was allowed 200 pounds extra per day and the sale of those extra scallops was used by the vessel to pay the observers. When the quota for scallops and bycatch quota for yellowtail flounder were not reached by October 5, all vessels were allowed an additional 3 trips and the fishery remained open until the bycatch quota for yellowtail flounder was caught.

Observer Program Management

In 2003, vessels were allowed 300 extra pounds of scallops for each day an observer is deployed. Each year an amount is charged to vessels for each day an observer is deployed to their vessel. The vessel provides a check for this amount to the contractor who places the funding into a dedicated checking account. NMFS authorizes payment from this fund to pay observer costs.

Beginning in 2003, data collected in this fishery are being edited and entered into the Observer Database. Prior to that time only summaries of data were used for quota monitoring purposes.

Observer Coverage

Unit and definition of fishing effort for purpose of estimating coverage: A sea day is defined as a day when the vessel is not at the dock. This includes time spent steaming to, from and between fishing grounds, time doing repairs or waiting for weather at sea, time deploying or retrieving gear or time spent searching for fish. In 1999, approximately 140 trips were made for a total estimated 1000 sea days. In 2000, approximately 250 trips were made for a total estimated 300 sea days. In 2001, approximately 100 trips were made for a total estimated 1200 sea days. In 2002, approximately 80 trips were made for a total estimated 960 sea days.

Portion of fishing activity observed: From 1999 to present (2003) the observer coverage has been approximately 25% of total fishing effort.

New England and Mid-Atlantic Gillnet Fisheries

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Observer Program Mandate and Authority

Mission of the program: The Northeast Fisheries Science Center (NEFSC), NMFS is required to collect scientific, management, and economic data about fisheries through observers placed aboard U.S. domestic and foreign fishing vessels. NMFS also has specific responsibilities concerning marine mammals and sea turtles within Federal and state waters.

Fishery management: Federal/State.

Authority to place observers: Marine Mammal Protection Act and the Magnuson-Stevens Fishery Conservation Act.

Voluntary or mandatory: Mandatory.

Program duration: The domestic fisheries sampling program began in 1989 primarily covering the pelagic drift gillnet fishery and the New England sink gillnet fishery. The program has since expanded to include anchored and drift, and sink and float gillnet fisheries from Maine to North Carolina, as well as beach seine, beach anchored gillnets, stop seine, and pound nets.

Fishery Description

Target species: Atlantic cod, pollock, various flounders, spiny and smooth dogfish, monkfish, Atlantic croaker, weakfish, bluefish, mackerel, menhaden, shad, spot, Spanish mackerel, striped bass.

Other commercially landed species: Winter skate, clearnose skate, sea robin, Atlantic herring, little skate.

Bycatch: Marine mammals observed taken include: harbor porpoise, harbor seal, grey seal, harp seal, bottlenose dolphin, white sided dolphin, and pilot whale. Other bycatch includes loggerhead, Kemp Ridley and green sea turtles, sea birds and many species of fish that are discarded primarily for lack of market or by regulations such as closed seasons.

Fleet size: Over 1,000 vessels, which may fish state coastal waters or EEZ waters. Vessels may have multiple permits for different state and Federal fisheries, some of which may not be used.

Season of operation: Varying locations, year round.

Observer Program Management

Brief overview of program structure: Program responsibilities are shared between NMFS and one contracted observer provider. The contractor provides observer candidates for training and testing by NMFS. An annual schedule for sea day coverage is provided by NMFS to the contractor. The contractor supervises and deploys observers and assures delivery of data to NMFS.

Service delivery type and function of each entity: NMFS is responsible for complete funding of the program. Via direct contract with NMFS, an observer contractor is responsible for observer recruiting, deployment, logistics, gear, insurance and delivery of observer data to NMFS. NMFS is responsible for training and certifying and debriefing observers, editing, entering and auditing data, and responding to data and coverage level requests using both NMFS staff employees and contractors working on site. NMFS also ensures that the sea day schedules are being met and that vessel selection is being done fairly and appropriately.

Observer Coverage

Unit and definition of fishing effort for purpose of estimating coverage: A sea day is defined as a day when the vessel is not at the dock. This includes time spent steaming to, from and between fishing grounds, time doing repairs at sea or waiting for weather at sea, and time deploying or retrieving gear or time spent searching for fish. Sea days are computed from when the vessel leaves port until the vessel returns to port and lands its catch.

Fraction of fishing activity observed: Approximately 2–5% of days fished have been observed. Additional days have been spent in recent years observing beach haul seine, beach anchored gillnets stop seine, and pound net fisheries at <1% of the fishing effort.

Sea Scallop Closed Area

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Background

In December 1994, three areas of Georges Bank were closed to all gear capable of catching groundfish. This included scallop vessels due to the occurrence of groundfish bycatch in the scallop dredge. This closure was requested by the New England Fishery Management Council and caused the permanent change to the Northeast Multispecies FMP via Framework Adjustment 9. In April 1998, NOAA Fisheries closed two areas in the Mid-Atlantic to protect the abundance of smaller scallops in these areas.

In June 1999, the New England Fishery Management Council voted to re-open a portion of Closed Area II (one of the Georges Bank closed areas). In June 2000, the same area was opened again as well as Closed Area I and the Nantucket Lightship Closed Area for short periods of time until February 2001. Currently, the two Mid-Atlantic closed areas (Hudson Canyon and Virginia Beach) are open until February of 2003 and have been open to scallopers since April of 2001.

In order to fish in these areas while they are open, the scallop vessels are required to call Patricia Yoos at NOAA Fisheries, Woods Hole, Massachusetts. The vessels must carry the observer assigned to them by Ms. Yoos, and if an observer is not available, they are issued a waiver to fish without one. In 2000 and 2001, as an incentive to carry an observer as well as cover additional costs, the vessels were allowed to land an additional 200 pounds of scallop meats per day fished. In 2002, the vessels were allowed to land an additional 300 pounds of scallop meats per day fished. This allowed for the vessels to pay for the observers and make a modest profit. The Sea Scallop Exemption Program is industry funded.

Observer Duties

Observers who work on scallop vessels fishing in the closed areas have a unique sampling protocol. They are required to collect shell heights on kept and discarded scallops and obtain a bushel weight of both kept scallop meats and discarded scallops in the shell. The observers take a volumetric measurement of their shell height sample for the kept scallops and are required to submit total pounds of scallop meats observed for a 24-hour period every morning to NOAA Fisheries. Other observer duties include sampling all bycatch and recording positions and times of all haulbacks.

Summary of Services

A.I.S., Inc. has been the contractor for the Sea Scallop Exemption Observer Program since May of 2000. For the 2000–2001 fishing season and the openings of the three Georges Bank closed areas, A.I.S. Inc. covered a total of 247 observed trips with an additional 4 broken trips and 1925 observer sea days.

A target level of 25% observer coverage was set for these areas. A.I.S. Inc. supplied trained observers throughout the season with 51.8% observer coverage in Closed Area II, 35.3% observer coverage in Nantucket Lightship Closed Area, and 35.1% observer coverage in Closed Area I. A.I.S. Inc. also supplied observers for the reopening of Closed Area I in January of 2001 with 29.4% observer coverage.

For the 2001–2002 fishing season and the opening of the two Mid-Atlantic Closed Areas, A.I.S. Inc. covered a total of 97 observed trips with 1035 observer sea days. A target level of 10% observer coverage was set for these areas. A.I.S. Inc. supplied trained observers throughout the season with 16% observer coverage in Hudson Canyon and 14% observer coverage in Virginia Beach.

Currently, A.I.S. Inc. is supplying observers for the 2002-2003 fishing season in the Mid-Atlantic Closed Areas. A.I.S. Inc. staff also edits and enters data for the closed area trips and prepares them for uploading into a master database at NOAA Fisheries, Woods Hole, Massachusetts.

East Florida-Georgia Directed Shark Gillnet Fishery

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Observer Program Mandate and Authority

The mission of the shark gillnet observer program is to provide year-round estimates of catch and bycatch in the east Florida-Georgia shark gillnet fishery, including estimates of marine mammal and turtle interactions. During the Right Whale Season (15 Nov.–1 April), 100% observer coverage is required for vessels operating between West Palm Beach, FL, and Sebastian Inlet, FL, under the directive of the Atlantic Large Whale Take Reduction Plan and the Biological Opinion issued under section 7 of the Endangered Species Act. In March 2001, an interim rule to the Fishery Management Plan for Highly Migratory Species established a level of observer coverage outside the Right Whale Season that would provide an adequate sample size to estimate marine mammal and turtle interactions with an expected coefficient of variation of 0.3. The National Observer Program provides funding, and average yearly program costs are around $300,000.

Fishery Description

Currently, a total of six boats make up the shark gillnet fishery on the east coast of Florida and Georgia. The boats are relatively small, and captains generally fish for sharks year round. Effort can be up to 250 days per year, but this number is variable. Fishing gear is comprised of a drift gillnet, but this net can also be used to "strikenet" for sharks. Drift gillnets fish passively, while strikenetting involves actively encircling a school of sharks with the net. On average, more than 85% of the drift gillnet total catch by weight consists of sharks, but the total catch numbers fluctuate by year and season. Bycatch is variable and includes little tunny (Euthynnus alletteratus), king mackerel (*Scomberomorus cavalla*), cownose rays (*Rhinoptera bonasus*), and barracuda (*Sphyraena barracuda*). Strikenet sets tend to have very little bycatch, with sharks making up more than 99% of the total catch. Marine mammal and turtle interactions have occurred, but are generally rare.

Observer Program Management

Dr. John Carlson, a fishery biologist with the National Marine Fisheries Service (NMFS) in Panama City, Florida is the Observer Coordinator for the Shark Gillnet Fishery and is responsible for the sampling design. Dr. Carlson and technician Ivy Baremore train and deploy observers and are in charge of data entry, editing, and database maintenance and security. Six NMFS approved contract observers are hired through Johnson Controls Inc. for the Right Whale Season. These 6 observers remain on site and provide 100% coverage from 15 Nov–31 March. Depending on funding availability, between 1–2 observers are deployed during the Non Right Whale Season, and generally cover vessels for 2-week periods during which 2–3 boats are selected for coverage. Observers are not unionized, and the average observer retention rate is around 50%. It is unknown if any violations have been issued based upon observer data.

Observer Coverage

Because the boats are small, the crew generally stays at sea for fewer than 24 hours at a time, although the bigger boats may make 2–3 day trips. A fishing day or trip is the time from which the boat leaves port until it returns. The average number of observed fishing days per year varies depending on funding availability and fishing effort. During the Right Whale Season there is 100% observer coverage, and observer coverage during the Non Right Whale Season is sufficient to provide an accurate description of the catch and by-catch of the fishery.

U.S. East Coast Bottom Longline Shark Fishery

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Observer Program Mandate and Authority

The mission of the Commercial Shark Fishery Observer Program (CSFOP) is to obtain accurate information on catch composition, fishing mortality, disposition of catch and by-catch, and fishing effort by sending biologically trained fishery observers to sea aboard U.S. East Coast bottom longline shark fishing vessels. Since the shark catch is headed, gutted and finned at sea, port sampling is not a viable means of quantifying the catch because the marketed carcasses are difficult, if not impossible, to identify to species. In addition, by-catch in the fishery is discarded at sea or used as bait and thus cannot be quantified at the dock. Authority to place observers aboard commercial shark fishing boats is granted by the Magnuson-Stevens Fishery Conservation and Management Act. This program was operated as voluntary, cooperative initiative between commercial fishers and non-NMFS research biologists during the 1994-2001 period and became a mandatory program in 2002. Funding for the CSFOP historically has come from a variety of Department of Commerce funding sources, including MARFIN, SK, and the NMFS. The CSFOP currently receives funding from the Office of Sustainable Fisheries, National Marine Fisheries Service with an annual budget of $320,000.

Fishery Description

The bottom longline shark fishery is a multi-species fishery. The two main target species are sandbar (*Carcharhinus plumbeus*) and blacktip (*Carcharhinus limbatus*) sharks. Other targeted species include bull, scalloped and great hammerhead, and spinner sharks and any other non-protected large coastal shark. Some small coastal shark species including Atlantic sharpnose and blacknose sharks are also commonly caught and landed (and occasionally targeted) in this fishery. By-catch of non-target species is very low in this fishery but does include red grouper (*Epinephilus morio*), cobia (*Rachycentron canadum*), barracuda (*Sphyraena barracuda*) and stingrays (*Dasyatis sp.*). Bottom longline gear using various size (mostly #13, #14 and #18) and style (mostly circle) hooks is employed in this fishery. Most of the main lines are monofilament line, but some use wire cable. The fishery runs from New Jersey to Texas, although most of the fishing occurs in Florida and the Carolinas. The Atlantic shark fishery is a limited entry fishery with 287 directed shark fishing permits and 585 incidental shark landing permits. With these permits a fisherman can land any non-protected shark from any of the three management categories: large coastal sharks, small coastal sharks, or pelagic sharks. There are two fishing seasons per year, the first running form January 1-approximately April 15 and the second form July 1–about September 15. Ending dates are dependent on the previous years total harvest as it applies to the semi-annual and annual quotas. The annual quota is 1,760 mt dw, with 755.5 mt dw available in the first season and 655.5 mt dw in the second season. This year, 722.5 mt dw was landed in the first season and 422 mt dw was landed in the second season.

Observer Program Management

The Highly Migratory Species division of the National Marine Fisheries Service and the CSFOP are cooperatively responsible for sampling design. CSFOP Project Manager George H. Burgess and Alexia Morgan, CSFOP Observer Program Coordinator, are responsible for hiring observers. Burgess, Franklin F. Snelson, and Andrew Piercy (biological sampling) and Morgan (methods and materials, sea safety, biological sampling), train the observers. The Observer Coordinator is responsible for deployment of observers and, with the help of one other full time observer, database maintenance, data entry, data editing, quality assurance and quality control. Currently six observers are employed, one full-time and five part-time. Observers are employed by the University of Florida and, with the exception of the single full-time position, are hired by the season (with anticipation of more prolonged employment if performance is appropriate and funding forthcoming). Each observer averages 27 sea days per semi-annual fishing season. The retention rate for observers varies but has been as long as 4 years and a shore as one season. Two violations have been issued during the 2002-fishing year. Prior to 2002, the program was voluntary and no violations could be issued.

Observer Coverage

During the fishing season of the 2002 fishing year, 75 sea days were observed with and estimated 2% of the landed catch. The second fishing season had 149 sea days observed with an estimated 4% coverage. Between 1994–2001 an average of 120 sea days per fishing year were observer with about 2% coverage. A sea day is one 24-hour period at sea, regardless of activity.

Pelagic Longline Fishery Targeting Swordfish, Yellowfin and Bigeye Tunas in the Gulf of Mexico, Caribbean and Atlantic

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Observer Program Mandate and Authority

The Pelagic Observer Program (POP) provides catch and effort data for the U.S. longline fleet under the authority of both the Magnuson-Stevens Act and Atlantic Tuna Conservation Act of 1975, which authorizes the Secretary of Commerce to administer and enforce provisions of the International Convention for the

Conservation for Atlantic Tunas (ICCAT), as well as the Atlantic HMS Fishery Management Plan. The Grand Banks Experimental Fishery is a result of a Section VII consultation under the Endangered Species Act to mitigate sea turtle takes. Funding for the program remained a constant level ($350K) between 1992 and 2000, increased to $750K in 2001, and increased to $1.2 million in 2002 to pay for 8% overall observer coverage and 100% observer coverage in the Grand Banks.

Fishery Description

Size of fleet: The U.S. pelagic longline fishery fleet, numbering between 125–140 vessels 40–90 feet in length, fishes year round.

Annual landings: 2,195 mt swordfish and 2,223 mt tuna are landed annually.

Non-target commercial species: Can include mako shark, finfish (dolphin fish, escolar, wahoo), and bluefin and albacore tuna.

Discard of non-target species: Can include sharks, rays and lancetfish.

Protected species: Can include mammals, sea turtles and sea birds.

Observer Program Management

Miami Laboratory staff is responsible for the overall operation of the program, including training, vessel assignments and data management. A cadre of experienced observers are paid directly by the program under individual purchase contracts, and the remainder are hired and deployed by Johnson Controls, Inc. located in Pascagoula, Mississippi. The program has historically employed 8-10 observers. With our new coverage requirements, we anticipate our observer corps to increase to 15–20 observers. The average deployment is 10–15 days, and 30–35 days for the Grand Banks. This program saw a 4-year retention rate between 1992–1999. Since going to an outside contractor and hiring special project observers for the Grand Banks, we may begin to see a higher turnover. Observers are not unionized in the Southeast Region. No violations have been issued as a direct result of observer data.

Observer Coverage

Observer coverage is based on total sets fished by the fleet, as reported in the Pelagic Logbook system for the previous year: 5% coverage represented 900 sea days and 500 sets; 8% coverage and 100% coverage in the Grand Banks will increase out observer effort to approximately 2000 sea days and 1,100 sets.

Southeastern Shrimp Otter Trawl Fishery

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Observer Program Mandate and Authority

Mission of the program: To characterize shrimp trawl bycatch and evaluate various gear types for the reduction of bycatch.

Fishery management: Federal.

Authority to place observers: Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act.

Vessel selection: Voluntary random.

Funding source: Variable by year.

Annual program costs: Variable by year.

Fishery Description

Target species: Penaeid shrimp (brown, white and pink).

Other commercially landed species: None.

Bycatch: Finfish bycatch includes red snapper, groundfish, with Atlantic croaker and longspine porgy the dominant species both in number and by weight for the Gulf of Mexico. Four Atlantic bottlenose dolphin, one manatee, and 469 sea turtles reported.

Gear type: Bottom otter trawl.

Area of operation: Gulf of Mexico and U.S southeastern Atlantic.

Number of vessels participating in fishery: Approximately 4,500 USCG documented vessels and an unknown number of state registered boats.

Size range of vessels: 40–90 feet.

Months of operation: Year round; highest effort from May through December.

Average annual catch of target species: 300 million pounds in 2000.

Average number of fishing days per year: 200+ per vessel.

Observer Program Management

NOAA Fisheries Galveston Laboratory is responsible for sampling design and onboard sampling protocol. Observers are hired through contract with Johnson Control, Inc. (JCI). NOAA Fisheries Galveston directs observer training, deployment, debriefing, data entry, and data management. Gulf and South Atlantic Fisheries Foundation, Inc. (Foundation), a non-government entity, has a similar observer program, with both groups seeking the same goals and objectives through a cooperative arrangement. All data are housed and managed by NOAA Fisheries Galveston Laboratory.

Number of observers: 20–25.

Observers employed by: JCI.

Average deployment length: 15 days (range from 1 to 62 days).

Average observer retention rate: 6 months.

Observers unionized: No.

Number of violations issued annually based on observer data: None.

Observer Coverage

Average annual number of observer fishing days: 1,500—dependent on funding level.

Definition of fishing days: 24 hours of trawling.

Percent coverage: Less than 1%.

U.S. West Coast Swordfish Pelagic Longline Fishery

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Observer Program Mandate and Authority

Mission of the program: To document the incidental take of marine mammals, sea turtles, seabirds, target and non-target fish species, and to collect selected biological specimens. To collect socioeconomic data from vessel owners/operators.

Fishery management: Federal and State (California Department of Fish & Game).

Mandatory authority to place observers: Marine Mammal Protection Act, Category II Fishery

Program duration: October 2001 to present.

Annual program costs: Agency costs US $250,000.

Funding source(s): Federal Government funded.

Government staffing: Management—2 FTEs (Full Time Equivalents).

Fishery Description

Target species: Swordfish.

Other commercially landed species: Tunas (albacore, bigeye, bluefin), dolphinfish, opah.

Bycatch: Blue shark.

Incidental takes of marine mammals: Unknown, Sea turtles: Loggerhead & Olive Ridley,

Seabirds: Black-footed albatross.

Fleet size: Approximately 24 active vessels. Vessels are 60–85 feet long.

Gear: Vessels typically set 40 miles of mainline, with approximately 800 hooks attached to evenly spaced dropper lines. Large squid are used as bait, and chemical light sticks are attached to the dropper line above every other hook.

Season of operation: The majority of the fishing effort takes place from September through May. Year-round the fishery is closed within 200 miles of the U.S. West Coast.

Observer Program Management

Brief overview of program structure: The Southwest Region is responsible for monitoring the West Coast swordfish pelagic longline fishery. Observer training is conducted in conjunction with Southwest Region–Pacific Islands Area Office, Southwest Fisheries Science Center - La Jolla and Honolulu Laboratory, NMFS enforcement, U.S. Coast Guard, U.S. Fish and Wildlife Service, and the fishing industry. To date, 4 biological technicians have been hired, trained and 3 trips (59 sets) completed. Trips typically last 30 days. The Southwest Fisheries Science Center receives the observer data in conjunction with High Seas Logbook data to estimate incidental take rates of sea turtles in preparation of annual reports.

Service delivery type and function of each entity: NMFS is responsible for observer training, debriefing, data entry, and data management. A NMFS approved contractor is responsible for observer recruitment, monitoring vessel activity, observer deployment, logistics, insurance/benefits, and delivery of observer data to NMFS. Vessel owners and operators may contact the designated contractor to make arrangements for the mandatory placement of NMFS trained observers aboard their vessels.

Other participating agencies: U.S. Fish and Wildlife Service.

Observer Coverage

Unit and definition of fishing effort for purpose of estimating coverage: Longline vessels in this fleet make a single gear haul (e.g., set) each day. The unit of effort is defined as the number of hooks deployed (i.e., 1,000 hooks—1 unit of effort).

California/Oregon Swordfish Drift Gillnet Fishery

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Observer Program Mandate and Authority

Mission of the program: To document the incidental take of marine mammals, sea turtles, seabirds, target and non-target fish species. To collect selected biological specimens.

Fishery management: Federal and State (California Department of Fish & Game; Oregon Department of Fish & Wildlife).

Mandatory authority to place observers: Marine Mammal Protection Act, Category I Fishery.

Program duration: July 1990 to present.

Annual program costs: Agency costs US $650,000.

Funding source(s): Government funded (Base, $500,000 Recover Protected Species funds).

Government staffing: Management—2 FTEs (Full Time Equivalents).

Fishery Description

Target species: Swordfish and thresher shark (common, bigeye).

Other commercially landed species: Mako shark, opah, louvar, and tunas (albacore, bluefin, yellowfin).

Bycatch: Blue shark and common mola.

Incidental takes: Cetaceans: Sperm whale, Humpback whale, Fin whale, short-finned pilot whale, Minke whale, short-beaked common dolphin, long-beaked common dolphin, Risso's dolphin, Dall's porpoise, Pacific white-sided dolphin, northern right whale dolphin. Pinnipeds: California sea lion and northern elephant seal. Sea turtles: Leatherback and loggerhead.

Fleet size: Marine Mammal Authorization Certificates are held by 95 vessels, approximately 75 are active. Vessels are 35–65 feet long.

Gear: Drift gillnets range in length from 800 fathoms, to the maximum allowable 1,000 fathoms. The stretched mesh size of a drift gillnet is typically between 18 and 21 inches.

Season of operation: The fishery is closed within 200 miles of the coast of California and Oregon from February 1 to April 30. From May 1 to August 14 the closure changes to 75 miles offshore. Most fishing occurs between August 15 and January 31, when closure restrictions are lifted. The majority of fishing effort takes place from October through December.

Observer Program Management

Brief overview of program structure: The Southwest Region is responsible for monitoring the California/ Oregon swordfish drift gillnet fishery. Observer training is conducted in conjunction with Southwest Fisheries Science Center–La Jolla Laboratory, Los Angeles County Natural History Museum, NMFS enforcement, U.S. Coast Guard, and the fishing industry. To date, 141 biological technicians have been hired, trained and 1,112 trips (6,346 sets) completed. In 2002 there were 16 observers observing the swordfish drift gillnet fleet. Trips typically last 6 to 20 days. The Southwest Fisheries Science Center receives the observer data to calculate estimates of incidental take rates of marine mammals in preparation of the Annual Stock Assessment Reports.

Service delivery type and function of each entity: NMFS is responsible for observer training, initial debriefing, and data management. Vessel owners and operators are responsible for contacting the designated contractor

to make arrangements for mandatory placement of NMFS trained observers aboard their vessels. A NMFS approved contractor is responsible for observer recruitment, monitoring vessel activity, observer deployment, logistics, insurance/benefits, and delivery of observer data to NMFS.

Other participating agencies: Through a cooperative agreement with the California Department of Fish and Game, total annual fishing effort is calculated for use in estimating total marine mammal mortality.

Observer Coverage

Unit and definition of fishing effort for purpose of estimating coverage: Drift gillnet vessels in this fleet make a single net-pull (e.g., set) each day, thus each day that a vessel makes a set is a sampling unit.

Fraction of fishing activity observed: Approximately 23 percent of the total fishing effort.

West Coast Groundfish Fishery Program (Bellingham, WA to Santa Barbara, CA)

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Target species and gear type: Trawling—Deep-water complex (Dover sole, Thornyheads, Sablefish), Nearshore complex (Rockfish, Dover sole, Arrowtooth flounder, sablefish, Rex sole, Slender sole, English sole), Rockfish, Petrale sole, Pacific whiting, Shrimp; Fixed Gear (Line gear and pot gear)—Sablefish, Rockfish.

Observer Program Mandate and Authority

Goal: To provide statistically valid data on the total catch and total discard of vessels participating in the West Coast groundfish fishery.

Management: Federal Government.

Authority to place observers: Federal Regulation 66 CFR 20609, April 24, 2001.

Voluntary/mandatory: Mandatory.

Funding source: Federal Government.

Annual program cost: $4 million.

Fishery Description

Target: Mix of Groundfish species including Dover sole, sablefish, thornyheads, rockfish, Petrale sole, arrowtooth flounder, and Pacific whiting.

Bycatch: Mix of groundfish targeted for retaining is also discarded due to regulation, size, or market, and Marine mammals, invertebrates.

Gear types: Trawlers, longliners, pot vessels, shrimp trawlers, Scottish seiner, various line gear (i.e. stick gear, cable gear), hook and line.

Area of operation: Coastlines of California, Oregon, and Washington.

Number of vessels participating in fishery: Limited entry—350 (trawlers, longliners, pot); open access—1,000 (ine and pot gear); recreational—unknown.

Size range of vessels: 10 feet to 100+ feet (including kayaks and skiffs).

Months of operation: Year round.

Annual catch of target species: Data unavailable at this time. TBA.

Average number of fishing days per year: Data unavailable at this time. TBA.

Observer Program Management

NMFS: Trains observers, logistical assignments, sampling design, contact vessels, debriefing observers, data editing, quality assurance and control, database maintenance and security.

Pacific States Marine Fisheries Commission: Selects and funds contractor for observer services, gear supply and maintenance.

Alaskan Observers, Inc. (AOI): Employs observers, arranges travel of observers (flights, hotels, etc.).

Number of observers: 20 to 40.

Observers' employer: Alaskan Observers, Inc.

Average deployment length: One year, eight months, or four months.

Average observer retention rate: After one year of program, of the 20 observers who started with us, 15 of 20 (75%) are resigning year contracts. As of August 31, 2002, 7 of 40 (18%) have quit or decided to not renew their contracts.

Observers unionized: No.

Average number of observed fishing days: Data not available at this time. TBA.

Definition of fishing day: A day when a vessel deploys or retrieves gear.

Percent Observer Coverage by Metric Tons Landed: September 2001–April 2002

State	Sept.– Oct.	Nov.– Dec.	Jan.–Feb.	Mar. –Apr.
California	9.90%	15.00%	23.60%	24.40%
Oregon	10.90%	16.60%	10.40%	21.50%
Washington	10.00%	15.20%	49.30%	18.70%

At-Sea Whiting Observer Program

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Fishery Description

The At-Sea Whiting Observer Program collects data from large catcher-processor trawlers fishing for Pacific whiting off the Washington-Oregon coasts. Each vessel carries two observers for all fishing days. As a result, nearly all hauls are observed. Because of the large size of the vessels, the observers are provided with a large sampling area, motion compensated scales to weigh their samples, as well as a flow scale to measure total catch. This produces very high quality data. This coupled with the timeliness of the daily transmission of this data, allows the fishery to be managed in real-time, using the observer data to determine when the quota is caught and what are the bycatch levels. The program is currently voluntary but regulations are pending for 2003, which will make it a mandatory program.

North Pacific Groundfish Observer Program

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Name of fishery oserved: Alaskan Groundfish Fisheries.

Observer Program Mandate and Authority

Mission of the program: Collect data on catch and bycatch quantity, composition, and biological characteristics, document fishery interactions with marine mammals and seabirds, monitor compliance with federal fisheries regulations.

Fishery management: U.S. Federal Government.

Authority to place observers: Magnuson-Stevens Fishery Conservation and Management Act (amendments to the Gulf of Alaska Groundfish and Bering Sea/Aleutian Islands Groundfish Fishery Management Plans); Marine Mammal Protections Act; Endangered Species Act.

Voluntary or mandatory: Mandatory.

Funding sources: The direct observer costs are industry funded; NMFS operational costs are government funded.

Program duration: 1973 to present. This program originally monitored foreign and joint venture fishing. It has been 100% domestic since 1991.

Annual program costs: The costs to industry are $8–10 million (US); the costs to NMFS are $3 million (US).

Fishery Description

Target species: All major groundfish species harvested in U.S. Federal waters of the Gulf of Alaska and Bering Sea/Aleutian Islands. This includes walleye pollock, Pacific cod, yellowfin sole, shallow and deep water flatfish, Pacific ocean perch, etc.

Other commercially landed species: None.

Bycatch: Bycatch of halibut, salmon, king and Tanner crab, marine mammals (several species), and seabirds (several species) occurs and is designated as prohibited species bycatch. Bycatch of groundfish also occurs in the groundfish fisheries.

Gear types: Trawl, pot (or trap), longline, and jig.

Area of operation: Bering Sea/Aleutian Island and Gulf of Alaska.

Fleet size: 350 vessels and 20 shore plants.

Size range of vessels: 60 feet and greater.

Season of operation: Year-round (closures subject to target and bycatch quota limits).

Total annual catch of target species: Total groundfish = 2 million t (pollock =1.2 million t, Pacific cod = 326,000 t, yellowfin sole = 181,000 t).

Total number of fishing days per year: Unknown.

Observer Program Management

Brief overview of program structure: The responsibilities of the North Pacific Groundfish Observer Program (NPGOP) are shared between the Observer Program Office (OPO), the observer companies, and the fishing industry. The OPO funds, and is responsible for, the overall administration of the program, observer company certification, observer training and certification, observer debriefing, and data management. The fishing industry is responsible for making arrangements for, and paying the direct costs of,obtaining NMFS-certified observers from an independent NMFS-certified observer company. Industry members are also responsible for obtaining the appropriate amount of observer coverage. The observer companies are responsible for recruiting qualified observer candidates, deploying observers, providing logistical support to observers, ensuring observer have been certified by the NMFS, providing required insurance for observers, providing observers' salaries and benefits, and delivering observer data to the NMFS.

Number of observers: 350-425 individual observers/year (395 in 2001).

Observers deployed by: Certified contractors.

Average deployment length: Deployment lengths vary from a few day to three months. In 2001, the average deployment length was 53 days.

Average observer retention rate: On average, each observer completes 2.8 cruises. Based on data from 1997 and 1998, 45% of all observers complete one cruise. However, almost 18% of all observers have completed 5 or more cruises. If observers can be retained for at least two cruises, the chances that they will continue observing are quite good.

Observers unionized: Of the five active contractors 3 are union, 2 are not.

Number of violations issued based on observer data: Unknown.

Observer Coverage

Observer coverage days: 25,000–40,000 (36,555 in 2001).

Unit and definition of fishing effort: Fishing day: a day in which fishing gear is retrieved and groundfish retained. Processing day: a day in which groundfish is received or processed.

Fraction of fishing activity observed: Vessels 125 ft. or longer = 100% coverage of fishing days. Vessels 60–124 ft. = 30% coverage of fishing days. Shore plants processing >1,000 t/mo = 100% coverage of processing days. Shore plants processing >500 t/mo = 30% coverage of processing days. No coverage of vessels under 60 ft.

Marine Mammal Protection Act Observer Program, Cook Inlet, Alaska

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The Cook Inlet Observer Program was the first of a multiyear program to observe 13 salmon net fisheries for marine mammal interactions in Alaska. Data were collected on all observed catch in the Cook Inlet set and drift gillnet fisheries, with observer effort focusing on marine mammal and bird by-catch. Of particular concern was the possible impact of gillnet fisheries on the declining stock of Cook Inlet beluga whales. During the summers of 1999 and 2000, 30 biologists observed 6,123 hours and 4,259 hauls. Marine mammal interactions (approaches within 10m of a net) were infrequent (5% of observed soaks). A total of 729 interactions with marine birds and mammals were recorded among both fisheries. Most (529) involved marine bird; harbor seals (118) were the most common of the 200 marine mammal interactions. Other interactions included sea otters (56), harbor porpoise (18), Steller sea lions (4), unidentified marine mammals (3), a river otter, and a minke whale. Temporal dynamics of marine mammal interactions differed by species and fishery. These patterns were associated with observations of local marine mammal abundance. No marine mammal mortalities were observed, however four harbor porpoise entanglements were recorded in the drift fishery. Two were released without injury; one sustained a small laceration, and one appeared seriously injured. An adult harbor seal and a harbor porpoise were the only observed entanglements with set nets; both self-released without injury. Observers also sampled beach stranded marine mammals in Cook Inlet (including six beluga whales). However, beluga whales were never observed interacting with nets. Marine bird entanglements were observed more frequently (12). These included gull, murre, loon, scoter, and murrelet species, and resulted in at least six mortalities. In contrast to many gillnet fisheries, those of Cook Inlet appear to have relatively infrequent marine mammal and bird by-catch rates.

Alaska Marine Mammal Observer Program Overview

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Observer Program Mandate and Authority

The Alaska Marine Mammal Observer Program (AMMOP) collects information annually and rotationally on over a dozen fisheries that have suspected interactions with marine mammals in Alaska. Observer coverage is mandated under the Marine Mammal Protection Act (MMPA) in order to monitor and report on levels of marine mammal and other by-catch interactions in these Category II fisheries. AMMOP's main objectives are to: (1) obtain reliable estimates of incidental serious injury and mortality of marine mammals and seabirds, (2) determine the reliability of marine mammal injury/mortality reports submitted by vessel owners and operators, (3) identify factors that may influence interactions with gear, (4) collect biological samples for scientific studies, and (5) record data on other by-catch and discards. The specific tasks over the next several years are to: (1) collect data in 2002 and 2003 of the salmon set gillnet fishery on Kodiak Island, (2) complete an outreach and logistics study in 2002 and 2003 to initiate observer coverage of the salmon drift gillnet fishery in Southeast Alaska, and (3) collect data in 2004 and 2005 of the salmon drift gillnet fishery in Southeast Alaska.

Observer Program Management

The program is scientific-based and collects information on environmental conditions, gear characteristics, fishing effort, catch statistics, and by-catch interactions. The program is supported by an observer contractor, currently Data Contractors Incorporated, with 15 to 30 observers in the field seasonally and is coordinated by NMFS staff at the Alaska Regional Office. Coverage is selected in a random systematic fashion, ranging from 5 to 10 percent of the fishing effort in a particular fishery. Data are archived at the NMFS Alaska Regional Office and published in the MMPA List of Fisheries and Marine Mammal Stock Assessment Reports. Reports, summaries, program descriptions, and manuals can be accessed on the AMMOP web page at: http://www.fakr.noaa.gov/protectedresources/observers/mmop.htm.

Hawaii Pelagic Longline Fishery

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Observer Program Mandate and Authority

Mission of the program: To observe and document all species caught, including sea turtles, seabirds, marine mammals, swordfish, tunas, sharks, and other non-target fishes and collect selected biological specimens.

Fishery management: Federal Government.

Authority to place observers: Magnuson-Stevens Fishery Conservation and Management Act, Pelagic Fishery Management Plan (required by the biological opinion and incidental take statement, Section 7 consultation under the Endangered Species Act).

Voluntary or mandatory: Mandatory.

Funding source: Federal Government.

Annual program costs: Approximately 3 million.

Program duration: February 1994 to present.

Fishery Description

Target species: Bigeye tuna, Yellowfin tuna, and Albacore Tuna.

Other commercially landed species: Marlin (blue, striped, shortbill spearfish, sailfish), shortfin mako shark, longfin mako shark, dolphinfish, wahoo, opah, barracuda, and pomfrets, thresher sharks (bigeye and pelagic), tunas (skipjack), and swordfish.

Bycatch: Blue shark, oceanic white tip shark, crocodile shark, silky shark, bignose shark, salmon shark, pelagic stingray, lancetfish, snake mackerel, escolar, oilfish, *Cubiceps sp*, common mola, manta ray, remoras.

Incidental takes: Sea turtles—Loggerhead, leatherback, olive ridley, and greens. Seabirds—Black-footed and Laysan albatross. Cetaceans—Risso's dolphin, Short-finned pilot whale, false killer whale, bottlenose dolphin, spinner dolphin, common dolphin, spotted dolphin, humpback whale, and sperm whale.

Gear type: Pelagic longline.

Area of operation: Western and Central Pacific (Hawaii, American Samoa, Guam, Northern Mariana Islands)

Fleet size: There are 164 Federal limited entry longline permits allowed in the fishery with approximately 110 vessels actively fishing.

Size range of vessels: 50–110 ft.

Annual catch of target species: Bigeye tuna—5,220,000 lbs; Yellowfin tuna—2,230,000 lbs; Albacore tuna—2,800,000 lbs.

Number of fishing days per year: 12,500.

Season of operation: Year round.

Observer Program Management

Brief overview of program structure: The Southwest Region is responsible for monitoring the Hawaii pelagic longline fishery. A contract was awarded to supply observers. The Pacific Islands Area Office, in Honolulu, is responsible for monitoring vessel activity and deploying observers. Observer training is conducted in conjunction with Southwest Fisheries Science Center, Bishop Museum, NMFS enforcement, U.S. Coast Guard, U.S. Fish and Wildlife Service, and the fishing industry. Trips typically last 14 to 30 days. The NMFS Honolulu Laboratory analyzes the data in conjunction with logbook data to estimate total sea turtle takes and mortalities.

Data are used to prepare for the annual reports of biological opinions as required by the current biological opinion, reports for the Western Pacific Fishery Management Council, and estimates of bird mortality to the U.S. Fish and Wildlife Service.

Service delivery type and function of each entity: The observer contractor is responsible for observer recruiting, deployment, logistics, insurance and the delivery of observer data to NMFS. The NMFS is responsible for training, debriefings, and data management. Vessel owners and operators are responsible for contacting the program manager to make arrangements for placement of observers.

Other participating agencies: Western Pacific Fishery Management Council, U.S. Fish and Wildlife Service, U.S. Coast Guard, and the NMFS Office of Enforcement.

Number of observers: Approximately 35.

Observers employed by: Saltwater, Inc.

Average deployment length: 22 days.

Average observer retention rate: 70% of observers hired do more than one contract. Average number of contracts for repeat observers is 2.8 (many of these observers are still deployed). Including all hired, average number of contracts is 2.2.

Observers unionized: No.

Observer Coverage

Average number of fishing days: 2,827 sets observed in 2001, or 4,660 observer sea days.

Unit and definition of fishing effort for purpose of estimating coverage: Unit of effort is defined as the number of hooks deployed (i.e., 1,000 hooks –1 unit of effort).

Percent observer coverage: Approximately 25% of the trips. 100% of the sets are sampled for each trip.

Alaska Scallop Observer Program

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Observer Program Mandate and Authority

Mission of the program: To collect biological and commercial fishing data used for resource management. A variety of data are collected including scallop size, weight, age, and condition; crab and halibut bycatch; haul (species) composition; number, duration, and location of tows; scallop harvest and discard.

Fishery management: State of Alaska, Department of Fish and Game in cooperation with the National Marine Fisheries Service (NMFS) under a State–Federal Scallop Fishery Management Plan (FMP).

Authority to place observers: Alaska Scallop Fishery Management Plan.

Voluntary or mandatory: Mandatory.

Funding sources: Federal assistance is provided to the State of Alaska by a NOAA grant award to cover additional costs incurred to meet federal oversight. ADF&G funds scallop stock assessment and day-to-day management of the resource including staff salaries and indirect costs incurred by field offices throughout the state. Observer training is funded by a federal grant. Onboard observer coverage is funded by industry.

Annual program costs: Federal and state governments each provide $234,000 annually. Cost to industry for observer coverage is $190,000 annually (1997 to 2001 average).

Fishery Description

Target species: Weathervane scallops.

Other commercially landed species: None.

Bycatch of non-target species: Flathead sole, rock sole, rex sole, flounder, halibut, spiny dogfish, skates, starfish, Tanner crab, hermit crab, sea anemone, snails, and other invertebrates.

Gear type: New Bedford style scallop dredge.

Area of operation: Alaska (Statewide).

Fleet size: Currently nine permits.

Size range of vessels: 60 to124 feet.

Months of operation: July 1 through February 15.

Annual catch of target species: 760,507 (1997 to 2001 average).

Average number of fishing days per year: 497 (1997 to 2001 average).

Observer Program Management

Brief overview of program structure: ADF&G is responsible for the day to day management of the statewide scallop fishery and for the coordination, implementation, and administration of the statewide observer program. The department determines the project goals and objectives and is responsible for sampling design, data editing and entry, quality assurance and quality control, database management and security, analysis, report writing and interpretation of the data. The department is responsible for observer briefings and debriefings.

Service delivery type and function of each entity: An independent contracting agent is responsible for recruiting, hiring, and deploying observers. The North Pacific Fisheries Observer Training Center (OTC) in partnership with ADF&G conducts observer training.

Number of observers: 10 per year (1997 to 2001 average).

Observers employed by: Independent contracting agents.

Average deployment length: 25 days (1997 to 2001 average).

Average observer retention rate: 54% (1997 to 2001 average).

Observers unionized: Yes.

Number of violations issued annually based on observer data: 1.

Observer Coverage

Average number of observed fishing days: 449 (1997 to 2001 average).

Definition of fishing day: A calendar day in which a vessel makes at least one tow.

Percent observer coverage: A vessel fishing for scallops is required to carry onboard observer at all times. Observers sample approximately 30% of the daily tows made by the vessel.

Alaska Shellfish Observer Program

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Observer Program Mandate and Authority

Mission of the program: Collecting essential biological and fishery management data including quantifying species composition, bycatch, harvest, biological and legal crab carapace size distributions, the reproductive status of female crab and monitor regulation compliance.

Fishery management: State of Alaska Department of Fish and Game, Westward Region.

Authority to place observers: Alaska Statutes 16.05.05 and 16.05.251, Alaska Administrative Code 5 AAC 39.141, Alaska Board of Fisheries (BOF), and BOF appointed Crab Observer Oversight Task Force (COOTF).

Voluntary or mandatory: Mandatory.

Funding sources: Direct observer cost—industry funded pay-as-you-go and State of Alaska legislative authority to fund with cost recovery test-fish funds. ADF&G operational costs—State general fund and cost recovery test-fish funds. Observer training—Federal Sea Grant Funds, University of Alaska Anchorage North Pacific Fisheries Observer Training Center (OTC) and cost recovery test-fish funds for observer training practicums.

Annual program costs: Industry—$1.6 million; ADF&G—$470,000; Observer Program Cost recovery test-fish funded observer coverage—$400,000; Observer Training Practicum—$43,000; Data Entry and Edit—$265,000.

Fishery Description

Target species: King crab (blue, red, golden, scarlet), Chionocetes sp. crab (Tanner, snow, grooved, triangle), hair crab, scallops, and on occasion snails.

Bycatch of non-target species: Crab, cod, halibut, sablefish, pollock, snails, sculpins, coral, and echinoderms.

Gear type: Crab pots made of steel rods and heavy webbing with appropriate escapement devices.

Area of operation: Bering Sea, Aleutian Islands, and Gulf of Alaska South Peninsula.

Number of vessels participating in fisheries: 550 vessel registrations.

Size range of vessels: 55–185'.

Months of operation: Year round.

Annual catch of target species: King crab—15 million pounds; Chionocetes sp. crab—26 million pounds.

Average number of fishing days per year: King crab—2,450 (1999–2001 avg.); Tanner crab—6,500 (1999–2001 avg.).

Observer Program Management

Brief overview of program structure: ADF&G, the contracting agents and industry share responsibilities for the Shellfish Observer Program. ADF&G establishes observer and contractor qualifications, certification and decertification, conflict of interest standards, observer sampling protocols, review of training programs, testing, briefing and debriefings, analysis of observer data and reporting. The contracting agents and ADF&G hire, train and deploy observers, provide all logistical support, salary/benefits, and secure contracts with vessels. The responsibility of the fishing industry is to procure and pay for observer coverage when necessary, provide catch information and the opportunity to sample the catch according to Department requirements. An industry task force oversees the allocation of funds generated by the State's cost-recovery program.

Number of observers: Varies between 50 and 70 observers.

Observers employed by: Independent contracting agent and ADF&G.

Average deployment length: 30 days.

Average observer retention rate: 70%.

Observers unionized: Yes.

Number of violations issued annually based on observer data: Evidence was collected in 5 separate deployments in 2001.

Observer Coverage

Average number of observed fishing days: 2,058 days/year (1999–2001 avg.).

Definition of fishing day: One calendar day when gear is pulled.

In fisheries where there are no annual surveys of the crab populations, ADF&G requires 100% observer coverage on all vessel types during fisheries on unsurveyed crab grounds.

Fishery	Pre-registration Deadline[1]	Observer Coverage	Cost-Recovery Funded?	Observer Coverage	Cost-Recovery Funded?
St. Matthew blue king	August 24	Partial	Yes	100%	No
Pribilof red & blue king	August 24	Partial	Yes	100%	No
Bristol Bay red king	September 24	Partial	Yes	100%	No
Bering Sea *C. bairdi*	September 24	Partial	Yes	100%	No
Bering Sea *C. opilio*	December 24	Partial	Yes	100%	No
St. Matthew brown king	None	100%	No	100%	No
Pribilof brown king	None	100%	No	100%	No
Hair crab	None	100%	No	100%	No
C. tanneri & *C. angulatus*	None	100%	No	100%	No
Aleutian king crab (red or brown)	None	100%	No	100%	No
Paralomis & *L. couesi*	None	100%	No	100%	No

[1] When the pre-registration deadline occurs on a weekend or holiday, the deadline is extended to the next business day.
[2] AFA and CDQ catcher vessels are pay-as-you-go.

Washington Department of Fish and Wildlife At-Sea Data Collection Program

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Background

Excluding Pacific whiting, the West Coast groundfish fishery stocks and harvests have been declining since the early 1990s. Since 1993, despite the increasingly severe harvest restrictions, landings of groundfish have fallen. Most of the decline has occurred in recent years with current levels of harvest being less than half of the harvests achieved in 1993. Over the years, an unusually low level of recruitment into the fishery has occurred for many groundfish species. Changes in the California Current and an abnormally high number of El Niño events are likely to have contributed to the decline in the recruitment of several important long-lived rockfish species. These causes have exacerbated the difficulties in setting harvest quotas that attempted to counteract the decline in these stocks. This has a primary effect on the fishers and their crews, and secondary effects on port communities and fishery-related businesses, such as fish processors. The complex dynamics of managing the groundfish fisheries is further affected by the fact that recovery of these long-lived species will range from 10 years at the minimum to in excess of 50 years.

In recent years, the Pacific Fishery Management Council has been presented with new scientific information that suggests that productivity of West Coast groundfish is unusually low. As a result, more restrictive management measures have been adopted since 1998. During the 1983-1999 period, coast wide non-whiting landings have decreased 65 percent from 107,000 metric tons to 38,000 metric tons. In terms of revenue for the same period, non-whiting revenues have declined by 54 percent from $99.9 million to $46 million. The decline in abundance has been particularly severe for rockfish and flatfishes, which account for about half of the non-whiting revenue.

Since 1998, the Pacific Council has initiated rebuilding plans for nine overfished groundfish species. Critical to these rebuilding plans and to the overall improvement of groundfish management is the need for more and better scientific data. There are 82 species covered under the West Coast Groundfish Fishery Management Plan, and at present, there is little or no data on a large number of these species. There is a need for comprehensive, timely and credible data for priority species to aid in the conservation and rebuilding efforts for these stocks.

Observer Program Mandate and Authority

The Washington Department of Fish and Wildlife (WDFW) At-Sea Data Collection Program was initiated in 2001 to allow fishers access to healthier groundfish stocks while meeting the rebuilding targets of overfished stocks, and to collect bycatch data through an at-sea observer program. The data collected in these programs could assist with future fishery management by producing valuable and accurate data on the amount, location and species composition of the bycatch of rockfish associated with these fisheries, rather than using calculated bycatch assumptions. These data could also allow the Pacific Council to establish trip limits in the future that maximize fishing opportunities on healthy stocks while meeting conservation goals for depleted stocks.

Over the past two years, WDFW has implemented its At-Sea Data Collection Program through the use of federal exempted fishery permits (EFPs). In 2001 and 2002, WDFW sponsored and administered a trawl EFP for Arrowtooth flounder and Petrale sole, and in 2002, WDFW also sponsored a midwater trawl EFP for yellowtail rockfish. The primary objective for these experimental fisheries was to measure bycatch rates for overfished rockfish species associated with these trawl fisheries. Participating fishers were provided access to healthier groundfish stocks and were constrained by individual vessel bycatch caps. Observers were used to collect data on the amount of rockfish bycatch caught on a per tow basis and to ensure that the vessel complied with the bycatch cap; therefore, vessels participating in the EFP were required to have 100% observer coverage.

For the past two years, these costs associated with these observer programs were covered with federal Disaster Relief funds. The majority of those funds have been spent; however, WDFW is planning to continue its At-Sea Data Collection Program in 2003 and beyond, if possible, with having the participating fishers share the costs of the observer program.

The average costs associated with providing observer coverage (including salaries, safety equipment, sampling supplies) is approximately $2,500-3,000 per month observed. However, there are additional costs incurred by WDFW in providing staff time to administer, monitor, and oversee the observer program, as well as analyze the data that are collected.

Fishery Description

The Pacific Fishery Management Council manages Pacific Coast groundfish under a federal fishery management plan (FMP). The management goals of the FMP are to:

- Prevent overfishing by managing for appropriate harvest levels and prevent any net loss of the habitat of living marine resources.
- Maximize the value of the groundfish resource as a whole.
- Achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

The primary purposes of these EFP fisheries are to assist the Pacific Fishery Management Council in achieving the goals of the FMP by collecting bycatch data on overfished stocks to allow for informed management decisions in setting appropriate trip limits to maximize safe harvest levels of healthy stocks, and to provide a pilot program for the retention of rockfish overages.

Arrowtooth Flounder Trawl EFP (2001 & 2002)

Objectives: Measure bycatch rates for canary and other rockfish associated with the Arrowtooth flounder fishery through an at-sea observer program, and augment the NMFS West Coast groundfish observer program.

Qualifying criteria: 3-year cumulative landings total of at least 400,000 lbs of Arrowtooth flounder landed into Washington in the following calendar years: 1998, 1999, and 2000 Arrowtooth flounder landings into Washington in all three consecutive years (1998, 1999, and 2000), and be a Washington state resident with a valid Washington delivery permit

Duration: July & August 2001 (2 months) and May–August 2002 (4 months).

Number of participating vessels: 7 vessels (2001); 6 vessels (2002).

Targeted catch: Arrowtooth flounder and Petrale sole and could land unlimited amounts of each until bycatch cap of canary rockfish (200 lbs/mo per vessel) was reached.

Observer coverage: 100% observer coverage of all trips taken during time period specified.

Voluntary or mandatory: Mandatory retention of all rockfish (including "unmarketable" rockfish); overages were forfeited to the State at fair market value and recorded on separate fish tickets. Fishing in waters adjacent to State of Washington (north of 46E16'00" to U.S./Canada border). Deliver fish to a designated processor in Washington State. Pass U.S. Coast Guard safety inspection (2-year certified decal).

Yellowtail Rockfish Midwater Trawl EFP (2002)

Objective: Measure bycatch rates for widow and other rockfish associated with the midwater yellowtail fishery through an at-sea observer program.

Qualifying criteria: Minimum of 75,000 pounds of widow and yellowtail rockfish combined landings in either calendar year 2000 or 2001, and be a Washington state resident with a valid Washington delivery permit.

Duration: Two-month time period during May–August 2002 (either May/June or July/August).

Number of participating vessels: 15 vessels.

Targeted catch: Targeted yellowtail rockfish and could land up to 30,000 lbs/2 mo. until bycatch cap of canary rockfish (100 lbs/mo.) or widow rockfish (800 lbs/mo.; 2,000 lbs/2 mo. total) was reached.

Observer coverage: 100% observer coverage of all EFP trips; only one EFP trip allowed per month.

Voluntary or mandatory: Mandatory retention of all rockfish (including "unmarketable" rockfish); overages were forfeited to the State at fair market value and recorded on separate fish tickets. Fishing in waters adjacent to State of Washington (north of 46E16'00" to U.S./Canada border). Deliver fish to a designated processor in Washington State. Pass U.S. Coast Guard safety inspection (2-year certified decal).

Observer Program Management

Observers were hired as temporary employees of the Washington Department of Fish and Wildlife and were assigned to a duty station based on the vessel's homeport. The Arrowtooth flounder trawl vessels are based in the Bellingham/Blaine area, and the midwater yellowtail rockfish EFP included vessels in Neah Bay and Westport, Washington.

WDFW observers completed a two-week training course which will includes U.S. Coast Guard safety training–including survival suit immersion test and vessel safety, and WDFW training on fish identification, random sampling theory, data collection methods, current groundfish management issues, and additional safety measures.

WDFW fishery managers and biologists were involved in hiring and training the observers as well as administering and monitoring the program. WDFW scientific technicians sampled the catch dockside, collected biological data, and entered the data into an electronic database. Research scientists have analyzed the preliminary data from the 2001 experiment, and are finalizing a summary report. A more thorough analysis will be completed for the two-year Arrowtooth trawl EFP and will be available in April 2003.

In January 2000, the Secretary of Commerce declared a commercial fishery failure in the Pacific Coast groundfish fishery. In response to the request for disaster assistance, Congress appropriated $5 million in federal assistance to the affected states. Washington State received $1.5 million of the total appropriation, and a portion of those funds ($300K) went to WDFW to implement its At-Sea Data Collection Program.

APPENDIX 3

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APPENDIX 4

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Johnson Controls—*fisheries monitoring and consulting services*
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Juniper Systems, Inc.—*field computing solutions and mobile GIS/GPS for ruggedized applications*
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